THE AEROPLANE

Incorporating
Aeronautical Engineering
Edited by - - THURSTAN JAMES

Founder and First Editor
(1911-1939), C. G. GREY

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AS EASY AS A.B.C.

WRITING in *The Sunday Times* for January 12, Mr. Cyril Uwins, president of the Society of British Aircraft Constructors, pointed out that the qualities of British airliners now operating in all parts of the World add greatly to our national prestige, far outstripping their intrinsic worth. The export record of the Industry, exceeding £100 million in both 1956 and 1957 (as regular readers of THE AEROPLANE know full well), makes it a substantial factor in maintaining our balance of trade. The wisdom of retaining technical experts and work people in factories where their talents and skill are contributing to this national effort, as Mr. Uwins contended, cannot be denied. These and many other factors should stiffen our resolve to see our civil aircraft working wherever aircraft fly, and look for the ultimate expansion of our resources, rather than be actively planning their demise. These statesmanlike words will rally the spirits of those who had been waiting for a lead. Everybody with the good of British aviation at heart will feel the better for being reminded of what remains to be done instead of waiting to hear what is to be destroyed next.

This letter did not appear until the policy of the Government had been officially set forth on Friday last when, as we report elsewhere, it was made clear that the placing of the B.E.A. order, as indeed we had concluded last week, was to be conditional on the setting up of a group. It is certainly worth noting that the placing of a further order for a new, and as yet unspecified, commercial aircraft was mentioned as awaiting the formation of a group satisfactory to the Government.

How much can be offered by a consortium of aircraft firms was vigorously enunciated by Sir Thomas Sopwith at the annual general meeting of the Hawker Siddeley Group, when he commented upon the resources which would become available with the linking of Hawker Siddeley and the Bristol company.

By the time this issue of THE AEROPLANE appears the Government hope to have reached a settlement after the round-table discussions now being held with the various protagonists in this present conflict. We must all hope that it will not be unduly prolonged, for the longer it continues the nearer draws the day when U.S. manufacturers may decide to enter the field themselves. And should that happen, however great the resources brought together in this country, it would indeed be a mighty struggle to get a design into production ahead of the United States. Consequently, the feeling is widespread that a solution is urgent.

Things, it is quite clear, do not run much smoother on the other side of the Atlantic. We have just received the annual report of the U.S. aircraft industry from the Aircraft Industries Association of America, Inc., in which we learn of contracts being stretched out and cut, followed by re-institution of enhanced programmes. A figure which struck us as particularly significant, in view of the position of our own industry, was the statement that, by the end of 1958, deliveries of guided missiles are expected to exceed 35% of the total military sales of the U.S. industry. It is expected that unfilled orders for guided missiles will comprise at least 50% of the total military backlog in the United States.

We notice that 1960 seems to be around the time that is mentioned as being that in which ground-to-air missiles will be available for deployment; assuming that these are British-made, and not imported, it is probable that guided missiles do not yet form such a substantial part of our own productive effort as is the case in America. However, the figure is interesting as a measure of the changeover which has already taken place in that country.

We should like to think that the Government's efforts would be, after satisfying themselves about the size of the industry for war potential, directed to a well-planned research programme to ensure the smooth development of the next generation of aircraft. If they do not, no purely commercial activity is going to provide the know-how to build supersonic, much less hypersonic, airliners. There is another field in which this country has a chance to lead the World; we refer to VTOL. We seem to be as fully advanced as anybody else in the development of the latest VTOL units. The advent of aircraft with this revolutionary power plant will mean the end of miles of runways and their vulnerability. It is a must for military aircraft.

There seems to be general agreement that better co-ordination is required in the field of aeronautical planning. Perhaps the time is at last ripe for setting up in this country, to start with, an Aerial Board of Control. That, as some people may remember, was the ultimate air authority in Kipling's prophetic tale "With the Night Mail." A Board, immune to political change, could co-ordinate our air transport needs and the provision of equipment to the carriers that exist to satisfy these needs. Today it is more certain than when Kipling wrote his story that "Transportation is Civilization." And in the field of air transport construction a great investment of British genius, skill and experience lies waiting to be harvested.

MATTERS OF MOMENT

The Trial of Strength

DURING the past month it has become obvious that the procurement negotiations over British European Airways' medium-haul turbojet transport have been made into a test case. The opportunity is being taken by the Government—without whose approval and financial backing no order can be placed by the Corporation—to force the British aircraft industry to face the fact that all future civil aircraft, however expensive and important, must be genuine private ventures and to organize itself accordingly. The policy has already been put into practice by one major manufacturer—Vickers-Armstrongs—without Ministerial cajoling.

But it was not until Friday of last week that the Government's policy was stated by the Minister of Transport—who preferred to remain a "Government spokesman"—at a Press conference which was called at short notice. He explained that the Government was determined that the aircraft industry should really tackle the medium-haul project on its own and, by inference, that this order was being used as a means of forcing the units of the industry into some grouping or consortium which would ensure the technical and financial success of the venture. He added that such a consortium was necessary not only to provide the strength for this particular venture, but for other projects that would come afterwards. A technical/production/financial grouping which would be capable of dealing with the medium-haul turbojet aircraft on a World-market scale would also be able to deal with the very much more difficult and expensive (possibly supersonic) projects of the future.

The impression gained at the conference was that the Government would only be satisfied with a grouping which was even stronger than those already proposed and involving Hawker Siddeley, Bristol, de Havilland and others. Joint discussions between B.E.A., the Ministries of Transport and Supply and each individual company in turn are being held this week and some concrete and final answer was expected by today, Friday.

The point specifically made is that this medium-haul turbojet project is an immense task if it is to be carried through to a logical and successful conclusion. It is not simply a matter of obtaining the B.E.A. order, but of designing, developing, producing and selling this aircraft to World operators, on a time-scale which will ensure that adequate numbers are sold. The British civil aircraft industry is, in fact, being expected to compete with the American industry—but without the full-scale help of military orders and of a military aircraft research and development background.

No large transport aircraft has yet been made as an entirely commercial project by a manufacturer without military commitments to keep the wheels turning—and certainly not without the help of an ancillary industry which is similarly supported. It remains to be seen whether the Government fully appreciates the need for a continued research and development background in civil programmes.

News of India's Gnats

ACCORDING to a report from India, details of the proposed production schedules and the financial aspects of the Hindustan Aircraft/Folland Aircraft agreement relating to the production of Gnat light fighters in India are to be discussed in New Delhi later this month. Present expectations are that the first Indian-built Gnat will make its first flight by the end of 1958.

Large parts of the plant for the manufacture of the Gnat have already been flown to the Hindustan Aircraft Factory in Bangalore and technicians and engineers have been trained in the United Kingdom. According to initial estimates an Indian-built Gnat will cost no more than the equivalent of £45,000. The production of these aircraft is expected to be completed by 1961-62.

Aero-engine Prophecy

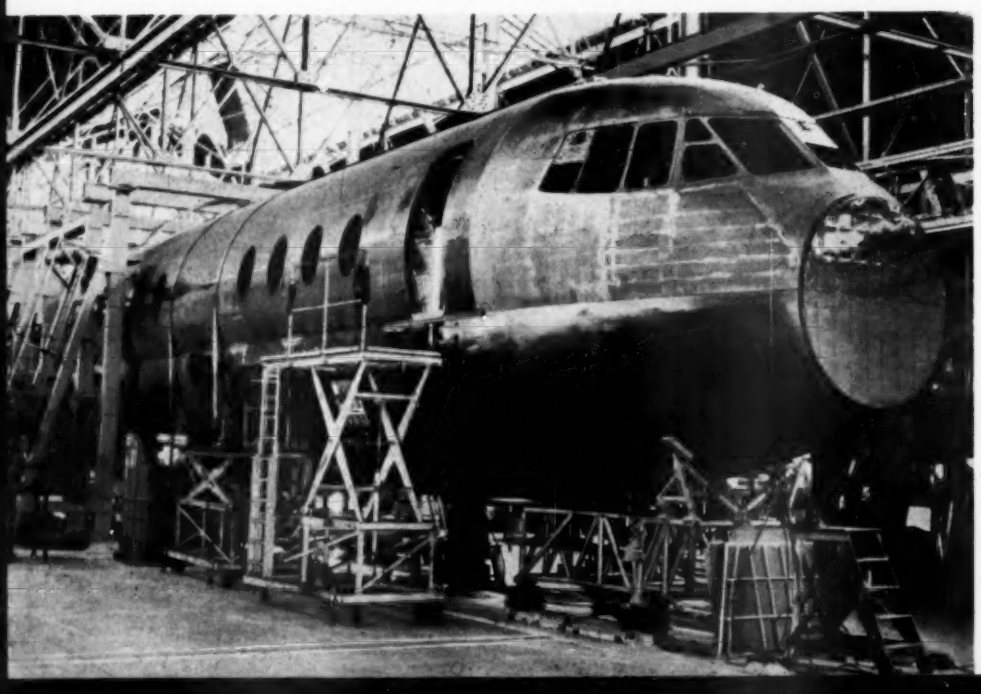
NUCLEAR-POWERED aircraft as a military scientific achievement will be built within the foreseeable future, but its practical application "awaits a military requirement for what it has to offer." This was one of the conclusions drawn by Mr. A. A. Lombard, F.R.Ae.S., chief engineer of Rolls-Royce's Aero-engine Division, in a main lecture to the Royal Aeronautical Society at Leicester on January 15. Commercial transport with nuclear power, he thinks, can be dismissed.

In his paper he examines the potential development of present aircraft turbine engines and attempts to forecast a limit to their development. Other conclusions are:—

There is a large gap between today's achieved military aircraft performance and that which is possible with an advanced form of reheated jet, which is probably capable of seeing through the whole development of the manned military aircraft.

The propeller turbine has bright prospects for freight aircraft. Its use in short-range commercial transport other than feeder lines may be limited to a further 10 years or so.

For ranges of the order of 500 miles, or more, a high pressure



VANGUARD PROGRESS.—A new picture of the first Vickers Vanguard in the fuselage assembly jig, with front, centre and rear sections now joined.

CONTENTS

MATTERS OF MOMENT 64 and 89
NEWS ITEMS 67
AIR TRANSPORT 70
THE FIGHTING SERVICES 77
THE DOUGLAS DC-8 IN PRODUCTION 79
GUIDANCE AND CONTROL FOR A HOMING MISSILE 83
FLAT-RISER BY RYAN (Vertiplane—pictures) 87
HELPING THE HELICOPTER 88
NORAL STRETCHED-PLATE FACILITIES AT ROGERSTONE (pictures) 90
NEWS OF INDUSTRY 91
PRIVATE FLYING AND GLIDING 92
CORRESPONDENCE 93
NOTES AND EVENTS 94

ATLANTIC CONTENDER.—As a result of design refinement and development of the Rolls-Royce Conway, the Vickers V.C.10—the first illustration of which appears here—is now offered as an aeroplane suitable for service over the North Atlantic. The V.C.10 was laid out originally for service on the Eastern and African routes of B.O.A.C. On January 14, the £60 million contract for 35 V.C.10s—largest ever placed with a British aircraft manufacturer—was confirmed by B.O.A.C. which has taken an option on a further 20. More details and another picture are on page 70.

ratio by-pass turbo-jet will be required, and this aircraft type will soon be announced.

There are prospects of some 10% improvement in fuel consumption for the long-range jet transport beyond that already being offered.

Complete integration of engines and aircraft with the object of combining jet performance with large lift capacity will be the next step beyond the short- to medium-range jet transport.

Economic supersonic commercial transportation will be possible, but unless there is a military demand it will take a number of years, due to its high engineering cost.

The State of an Industry

REVIEWING the past year in the American aircraft industry, Gen. Orval R. Cook, president of the Aircraft Industries Association, described 1957 as "probably the most extraordinary in the history of the aircraft manufacturing industry."

The year began on a relatively high and stable level of operations which had existed for four years, with some reorganization of work forces and facilities in anticipation of a gradual transition from aircraft to guided-weapons. At mid-year came fiscal crisis, contract stretch-outs, programme cancellations and severe limitations on overtime, progress payments and other cost items—resulting in sharp reductions in employment. Simultaneously the industry was called upon to finance an even greater part of the work it was doing for the U.S. Government.

As a result of the Russian I.C.B.M. and satellite successes, there was an immediate public reaction and concern over the lack of progress made by the U.S. in these fields with the result that many restrictions were removed and programmes in the fields of guided missiles and space technology were accelerated.

Employment averaged 880,000 workers compared with 814,000 for 1957. During the first half of the year the average was about 900,000 and at the end about 800,000. This figure will probably decline and some additional works close by the end of this year.

The 43 announced missile projects include seven air-to-air, seven air-to-surface, 10 surface-to-air and 19 surface-to-surface weapons. By the end of 1958, deliveries of guided missiles are expected to exceed 35% of total military sales, with unfulfilled orders representing at least 50% of the total military backlog.

H.S.G. Profits and Progress . . . .

IN his annual report to the shareholders, Sir Thomas Sopwith, chairman of the Hawker Siddeley Group, recorded a Group profit for the year ended July 31, 1957, of £12,108,483 before taxation. This compares with a corresponding figure of £12,847,867 for last year. It is interesting to note, incidentally, that these figures are reached after deducting £6,341,649 and £3,935,856 respectively for depreciation on fixed assets.

Sir Thomas had something to say about the need for continual aeronautical research if progress were to be made. Research, he said, is an insurance investment and the premium is remarkably small. If the country proceeds with its research programme, he went on, "the time may come when we shall want to apply the knowledge we have acquired. And we shall then be able to make our choice, to take a decision which will depend on the circumstances prevailing at that time. Up to that point it will have cost us relatively little, but it is essential for an adequate carpet of knowledge to be continuously created.

"It is worth remembering that research on military aircraft often leads to valuable results which are not confined to aviation but may spread throughout many branches of engineering and bring benefits and advantages that were never foreseen when the research was originally started."

Sir Thomas expressed the opinion that for many years we would need some types of manned military aircraft in addition to guided missiles. He thought, too, that a rapid and efficient military air transport system was "vital to the country" and would bring economies in other directions.

Speaking of the future outlook for the Group, Sir Thomas said that although it had expanded and diversified considerably, it was still in the aircraft industry and meant to stay in it. During the year under review they had spent £2 million on special projects—which were private ventures.

. . . . and the B.E.A. Project

AT the conclusion of his speech at the annual general meeting of the Hawker Siddeley Group, Sir Thomas Sopwith spoke about the B.E.A. turbojet transport order.

In addition to a strongly-worded refutation of the suggestion that there could be any kind of technical superiority of "one aircraft on paper over another" to the same basic specification, he pointed to the strength of the proposed consortium.

"I think it is fair to say," he said, "that this Hawker Siddeley-Bristol combination is the most powerful, single unit which has ever materialized in the British aviation industry. . . . For the first time, the nation has the chance in civil aircraft to compete on equal terms with the great American corporations in money, men and material resources of development and production.

"To our way of thinking this merger made sound sense and was exactly in line with Government policy—and no one seems to debate or argue this point. Everyone seems agreed that this combination of the most recent civil airliner experience enjoyed by Bristol with their great Britannia and Hawker Siddeley with its outstanding record of high-speed flight in exactly the very difficult Mach .9 speed regime, is an unbeatable combination. . . .

"The eventual quality of the product," Sir Thomas continued later, "is determined by the quality and strength of resources in terms of knowledge, experience and facilities which are placed behind the project. In addition, eventual success in penetrating the highly competitive World market is dependent on the ability to deliver a quality article at the right time and therefore the financial and manufacturing resources employed are an equally vital factor in decision. . . .

"Hawker Siddeley is one of the few companies which has had experience of designing, developing and putting into successful operation big jet aircraft flying in the speed range demanded by the new B.E.A. airliner. . . .

"It must be realized that the technical flight performance required for the B.E.A. airliner is comparable to that of a modern advanced bomber—is it not then sensible to draw on the design and flight experience already in our hands in this very difficult speed range? Surely this knowledge, gained at public expense in support of national defence, should now be deployed to aid the country's commercial prospects both at home and abroad. Isn't it folly to throw away this experience? And on the civil airliner side the success attained by the Bristol Britannia is at present an almost daily subject of comment with her record-breaking flights. Should not that experience be used on this new project?"

Missilemen Dine at Cranfield

DR. R. COCKBURN, C.B., O.B.E., M.Sc., Ph.D., was the guest of honour at the College of Aeronautics at Cranfield on the occasion of a dinner to meet members of the second N.A.T.O. course on guided missiles. As the Principal, PROFESSOR A. J. MURPHY, M.Sc., F.I.M., F.R.Ae.S., said in his speech in this second course there are representatives of seven countries: Belgium, France, Italy, the Netherlands, Norway, Portugal and Turkey. Professor Murphy emphasized how honoured the College were to have with them that evening His Excellency the Turkish Ambassador. There were nearly two hundred people present to hear the humorous speech made by LIEUTENANT Ø. LINGE from Norway in praise of the College. SIR FREDERICK HANDLEY PAGE replied.

In accord with College tradition proceedings went on long after the speeches and dinner were over, so it is safe to say that the missilemen and the guests found much of interest to discuss together.

Long Service Celebration

MANY companies express their gratitude to employees for long and faithful service, but few, I am sure, do it as handsomely and on such a scale as the Fairey company. On January 11, in the company's 42nd year, some 750 members of their Long-Service Association dined in London and 256 new members (including five ladies) who have recently completed 25 years' service were each presented with a gold wrist-watch and inscribed certificate. The happy and spirited assembly were entertained by speeches, films and cabaret.

MR. G. W. HALL, Fairey chairman and managing director, spoke as Association president and replied to Mr. G. Toms' toast, "The Old Firm." MR. W. BROADBENT, a retired director and chairman of the Association, presented 25-year watches to Mr. Hall and Mr. L. Massey Hilton, whose ill-health has compelled his retirement from the board. The chairman then spoke of the guests, among them Marcel Lobelle, closely associated with such types as the Fox and Swordfish; Air Marshal Sir Brian Reynolds, C.in-C. Coastal Command, who, as well as working closely with Fairey's during the last War, has in his log book no fewer than 800 hours on Flycatchers; and Mr. G. W. H. Gardner, Director, R.A.E. Farnborough, who has provided Governmental co-operation in developing some of the Fairey aircraft and their guided weapons.

ADML. SIR DENIS BOYD, in whose honour the Boyd Trophy was named, spoke for the guests. He produced a sparkling account of carrier operations in the Mediterranean at the time of Taranto and Matapan.—WREN.

Eagle's King-sized Occasion

LORD BRABAZON was among the guests of Mr. and Mrs. Harold Bamberg on the occasion of the King Flight Carnival on January 8. The floor was crowded with dancers; many of whom had taken King Flight holidays during the past year. Indeed the occasion could be regarded as marking the new look which is coming over the British air transport business. Mr. Bamberg started Eagle Aviation in quite a small way after the War. It has prospered steadily and as we have reported plans are now in hand for services linking Montreal and New York with Bermuda.

Associated with Eagle are Sir Henry Lunn, the travel agents. As Mr. Bamberg told the guests at the Albert Hall, it is just this association which makes possible the very remarkable inclusive terms which can be offered to holiday-makers.

And no doubt plans include a steady widening of the places to which holiday-makers can go. Among the guests were some from the Russian Embassy.

Spatial Engineering

AS briefly recorded in our previous issue ("High Hopes for the X-15") the present programme is for the North American X-15 rocket research aircraft to attain a height of more than 100 miles before the end of this year. The project is a combined effort by the U.S.A.F., U.S. Navy and NACA, the budget of $50 million covering the building of two aircraft. It is hoped that, if things go well, more funds will be allocated for the construction of a third.

Existence of the X-15 has been known for some time. It was announced that North American had started cutting metal in April of last year, having nearly completed wind-tunnel testing for the design.

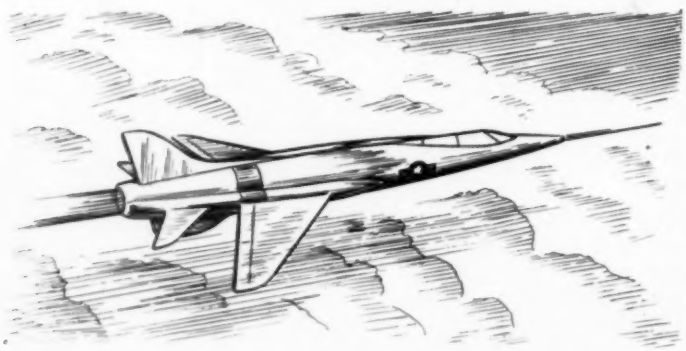
It is likely that rocket-boosters for the Navaho—developed by the company's Rocketdyne division—will be used to boost the X-15 to its ultimately intended height of 400 miles above the Earth.

In terms of speed the X-15 will be well into the hypersonic region and may eventually attain a Mach number of 8.0 or so. Initial test flying will be by Mr. Scott Crossfield of North American Aviation. After acceptance tests have been satisfactorily completed, Capt. Ivan Kincheloe of the U.S.A.F. will take charge of the main flying programme, which will ultimately take account of atmosphere re-entry problems and techniques. Capt. Kincheloe is the pilot who reached 126,000 ft. with the Bell X-2.

So far, only an artist's impression of the X-15 has appeared, but there is good reason to believe that it is based fairly closely upon the actual airframe shape. Although having a slight resemblance to the F-107, the X-15 is less brutish in appearance, for several reasons. Since it is rocket-powered, the X-15 has no air intakes and thus needs neither the gaping maw of the F-100 or the "double dustpan" dorsal intake of the F-107.

Commenting on the overall lines of the X-15, our U.S.A. CORRESPONDENT writes: "It signifies a most extraordinary change of design philosophy on the part of N.A.A. Hitherto, their aerodynamic design has been a massive mixture of brute force and crude ugliness, the latest being the F-107. The X-15 art would do credit to Ed Heinemann, apart from the low-set tail—which is pure NACA. Here is the first 'eyeable' N.A.A. design since Kindelberger floated the company—and I'm definitely not forgetting the excellent-performing Mustang with its ghastly tail lines."

Exceptionally pointed noses are no novelty for high-speed research aeroplanes and the X-15 complies with fashion in this respect, the usual "barber's pole" pitot finishing the nasal outline. Empennage design is unusual in that a sizeable underfin is used—the implication being that problems of directional stability are even worse at hypersonic than at supersonic speeds. There is the additional and very practical point that the shorter the (upper) fin, the easier can the X-15 be accommodated by a mother-plane prior to air-launching.



Wing and tailplane planforms are both of semi-delta type with sharply curved-back tips and anhedral is used on both to counteract the over-stabilizing effect of high sweepback angles at low speeds.

Certainly, if the X-15 does prove to be the first successful manned aircraft to solve the atmosphere re-entry problem (which it might do by 1961 according to present estimates) then it will be more graceful an aircraft than the current conception envisaging a form of ballistic missile carrying a man.—D.G.

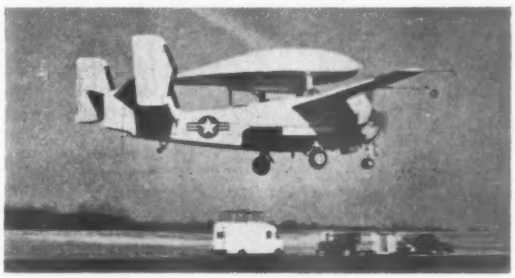
NEWS OF AIRCRAFT, ENGINES AND MISSILES

BELFAST BRITANNIAS. — Two of the additional seven Britannia 253s recently ordered by Transport Command are to be built by Short Bros. and Harland. The 30 Britannias now ordered from Belfast therefore comprise 15 of the 253s (and parts for the other five); five for C.P.A. (the first flew last week), five for Northeast (one has flown), three for the M.o.S. (independent trooping) and the two for Aeronaves de Mexico, now in service.

CANADAIR TRAINER.—Two prototypes of the Canadair CL-41 jet trainer are scheduled for completion this autumn for the R.C.A.F. In appearance, the CL-41 resembles the Cessna T-37, with side-by-side seating, but uses a single turbojet of about 2,000 lb. thrust. This will probably be either a Fairchild J83 or a General Electric J85, but the Armstrong Siddeley Viper may possibly be installed. (The Viper A.S.V. 10 engine has a 2,000-lb. thrust.) Loaded weight of the CL-41 will be 6,250 lb., and maximum speed, 400 knots.

LATEST KAMAN.— Features of the Kaman HU2K-1 seen in this mock-up are a retractable undercarriage and a servo-flap rotor-control system. This first single-rotor Kaman is powered by a G.E. T58 shaft turbine engine.

MILITARY JETSTARS.—The Lockheed Aircraft Corpn. is proposing to lay out seven military versions of the CL-329 Jetstar. They are for communications, photographic work, personnel and cargo transport, electronic countermeasures training, crew training and medical evacuation. The Jetstar is at present being prepared for evaluation testing by the U.S.A.F.



FLAT TOP.— A new picture of the Grumman WF-2 Tracer early-warning aircraft for the U.S. Navy, which has made successful aerodynamic prototype flights. It is in production under a $46 million contract.

ZERO-LENGTH MiG. — Successful experiments were recently conducted in the U.S.S.R. with the "zero-length" launching of MiG-19 jet fighters, with the assistance of rockets. Following the lines of similar American experiments, the MiGs utilize under the rear fuselage a single large solid-fuel rocket bottle, which is jettisoned once the aircraft is airborne.

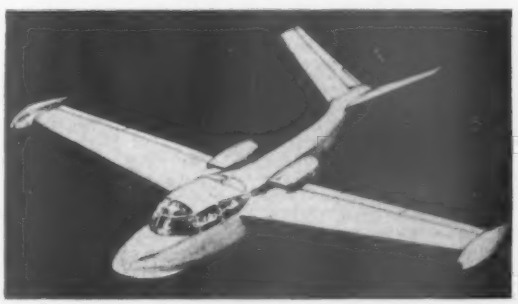
EXIT THE SUNDERLAND.—The last of 17 Short Sunderlands overhauled for the French Naval Air Service recently left Belfast. No more aircraft of this type will go to Belfast for overhaul; the 16 remaining Sunderlands, which are in service with the R.N.Z.A.F., will be overhauled at TEAL'S Auckland base.

CANADIAN EXPORTS.—More than 1,000 Beavers and 200 Otters built by The de Havilland Aircraft of Canada, Ltd., are now in use in some 50 countries. The U.S. Forces have over 700 Beavers and 100 Otters in service and several Otters are operated by the R.C.A.F. on behalf of the United Nations in the Middle East area.

R.C.A.F. FIREBEES.—Thirty Ryan KDA-1 Firebee jet target drones have been ordered by the R.C.A.F., for delivery in 1958, to assist in testing and evaluating present and future weapons systems. The Firebees, which are recoverable by parachute, will be launched from two Avro Lancaster 10s, modified by the Fairey Aviation Co. of Canada, and operated by the Central Experimental and Proving Establishment.

VERTOL CUT-BACK.—Pay-cuts ranging from 10% to 30% have been made by the Vertol Arcraft Corpn. from January 6 and 1,000 of the staff are to be laid off during the first quarter of this year. The company president, D. R. Berlin, has referred to sharply reduced production for 1958 and the need to reduce costs. At the beginning of 1957 some 4,800 were employed by Vertol; after the lay-off the total will be about 2,000, since staff has been steadily reduced throughout last year.

HUNGARIAN HELICOPTER.—The first prototype of a Hungarian helicopter is being built by the No. 2 Workshop of the Mechanical Laboratory, Budapest. Flight trials are planned for this summer. Estimated performance: Cruising speed, 80 m.p.h.; rate of climb, 400 ft./min. to a ceiling of 10,000 ft. A form of gyro-stabilization is used, presumably similar to that employed in Bell helicopters in America.



CRITERION.— An impression of the Air Craft Marine Engineering (ACME) Co.'s Model A-1 triphibian, a description of which is on page 89.

BLACKBURN ORDER. — Artouste 510 auxiliary power units have been ordered for the Canadair CL-44 transport from the Engine Division of Blackburn and General Aircraft, Ltd. This unit provides 80 s.h.p. for alternator drive and 125 lb./min. of compressed air for engine starting. Orders have already been placed for Palouste units in ground-starter trolleys for the Orenda Engines Iroquois powerplants of the Avro Arrow supersonic interceptor.

TYNE RATING.—The Rolls-Royce Tyne Stage 1 is now rated at 4,500 s.h.p. —an increase of 190 s.h.p. on the earlier figure. For the Vickers Vanguard this additional power means that 2,000 lb. more payload will be lifted from runway-limited airfields—or 3,000 lb. more from hot-weather airfields where the performance is limited by airworthiness climb requirements.

TRANS-BASS SYCAMORE. — On January 9 a Bristol Sycamore of Ansett-A.N.A. became the first rotating-wing aircraft to fly non-stop across Bass Strait from Melbourne to Launceston, Tasmania. It took 3 hr. 5 min. for the 291 miles, with a following wind. Helicopters on this route normally refuel twice.

ATLAS AWAY.—A successful launching of an Atlas ICBM from Cape Canaveral, Fla., was made on January 10. The Atlas weighs about 90 tons and has a slant range of 5,500 miles, for which it reaches a height of 800 miles.

RAINBOW PERFORMANCE.—Details of the Republic Rainbow transport project show that it is a 77,500-lb. aeroplane, to carry 80 passengers and powered by four 2,600-e.h.p. Dart R.Da.10 or General Electric T64 turboprops. Overall appearance is said closely to resemble the Viscount. Most attractive feature of the design seems to be its excellent take-off and landing characteristics—balanced field length in standard conditions is 3,160 ft.

NEWS ABOUT PEOPLE

Reproduced from "Histoire de l'Aeronautique," edited by Dollfus and Bouche.

THE FIRST OUT AND HOME RECORD

IN 1904 two French gentlemen offered a prize of 50,000 francs (1904 standards), called after them the Deutsch-Archdeacon, to be given "*au premier aviateur qui, après avoir coupé, en plein vol, une ligne de départ délimitée par 2 poteaux distants de 50 mètres, irait virer autour d'un 3e poteau placé a 500 mètres sur une perpendiculaire élevée du milieu de la ligne de départ et reviendrait couper, en plein vol cette ligne de départ, sans avoir touché terre de route.*" In other words, the winner had to do 500 metres out and 500 metres home without touching the ground. For four years this prize remained unclaimed and then at 10.15 hrs. on the morning of January 13, 1908 (50 years ago) Henri Farman performed the required feat at the first shot—that day. For the previous four months he had been trying and had failed.

This flight was regarded by many as establishing the fact that flight had come to stay. The Aéro-Club de France staged a banquet on the 16th at which prizes were given in all directions, to Farman, to the brothers Voisin and to Levavasseur, director of the Société Antoinette.

The excitement of the occasion is well captured by a contemporary report which runs, "On the aeroplane came with a steady flight, keeping at an even height [poetry, you will notice] and everyone felt that the prize was going to be won. Only one hundred yards more were to be covered, then fifty and still the machine showed no signs of coming down. At last it passed between the two flags. . . ."—F.H.S.

NEW PRINCIPAL.—Mr. J. A. C. Williams, M.Sc., A.M.I.Mech.E., A.F.R.Ae.S., A.B.Ps.S., has been appointed Principal of the College of Aeronautical and Automobile Engineering, Chelsea.

NAPIER IN CANADA.—Mr. L. A. Sanson has been appointed the senior resident representative in Canada of D. Napier and Son, Ltd., in succession to Mr. P. J. Waite, and will be responsible for the company's aviation and Diesel-engine activities. He will also represent the Guided Weapons and Aviation Equipment Divisions of the English Electric Co., Ltd. Mr. Sanson's address is 6035 Côte de Liesse Road, Montreal, 9.

COLLEGE APPOINTMENT.—Mr. John Loxham, C.G.I.A., M.I.Mech.E., M.I. Prod. E., has been appointed to the Chair of Aircraft Economics and Production at the College of Aeronautics, Cranfield, as from April 1, 1958. He is managing director of the Sigma Instrument Co., Ltd., and before he joined that company in 1939 was head of the engineering production department of the Northampton Polytechnic, London. He received the Sir Joseph Whitworth Prize in 1946.

E.E.C. APPOINTMENTS.—Mr. R. F. Creasey has been appointed deputy chief engineer of the Aircraft Division of the English Electric Co., Ltd., at Warton. Mr. B. O. Heath becomes chief project engineer, Mr. E. Loveless chief airworthiness engineer, and Mr. F. E. Roe chief

development engineer. The former assistant chief engineer, Mr. J. C. King, has joined the company's Directorate of Engineering in London. In the Aircraft Equipment Division at Bradford, Mr. W. G. Friggens (above, left), has been appointed assistant manager, and Mr. T. E. Simms (above, right), becomes chief sales engineer. Mr. W. Fisher has joined the Guided Weapons Division in London as head of overseas sales.

NAVIGATION DIRECTION.—Messrs. H. C. Lambert, G. Hawker, B.Sc., and G. L. Coles have been appointed to the board of the Decca Navigator Co., Ltd.

NEW CIVIL POST.—Air Chief Marshal Sir Ronald Ivelaw-Chapman, K.B.E., C.B., D.F.C., A.F.C., has been appointed a trustee of The Observer, Ltd. He retired from the R.A.F. last September having been Vice-Chief of the Air Staff since October, 1953.

COMMERCIAL AVIATION AFFAIRS

ANOTHER B.E.A. VISCOUNT.—An eighteenth Viscount 806 has been ordered by B.E.A. This is the second order for an 806 placed by B.E.A. with Vickers in recent weeks, the aircraft being intended as replacements for the two 802s lost in accidents at Belfast and Copenhagen.

B.O.A.C. PLANS.—According to Mr. Gerard d'Erlanger, speaking in Montreal, B.O.A.C. plans to introduce a daily Britannia service on the Atlantic in the spring, adding 60% to its present capacity on the route. He forecast that 60% of passengers will travel in the new "economy" class to be started in April.

FRIENDSHIP NEWS.—The C.A.A. Type Certificate for the Fokker Friendship, obtained in October, 1957, clears the aircraft for operations up to 35,700 lb., compared with the 34,520 lb. specified originally. Zero-fuel weight is now 32,400 lb. and landing weight remains unchanged at 34,000 lb. Among the purchasers of the 19 executive Friendships now on order is the Iranian Oil Exploration and Development Co. of London.

THE BRITANNIA IN MEXICO.—Aeronaves de Mexico's Britannia 302s have been operating at 70% load factors on the southbound New York-Mexico City run and at 50% on the northbound flights.

FASTER YET.—Israel Airlines regained the New York - London "record" on January 9, when one of their Bristol Britannia airliners crossed the Atlantic in 7 hr. 44 min. The aircraft was carrying 51 passengers and crew and over two tons of freight. The previous best time, by a B.O.A.C. Britannia, was 7 hr. 57 min.

QANTAS INAUGURAL.—The first of Qantas' round-the-World flights was completed on January 8. This inaugural flight was by way of being a grand tour lasting 19 days; the regular two-way services between Sydney and London started on January 14.

LOWER PROFITS.—The 12 major U.S. domestic airlines returned a net operating income of $69,806,000 (£24,920,000) during the first 10 months of 1957—a reduction of about $45 million (£17 million) by comparison with the income for the same months of 1956. There was a 13.4% increase in revenue passenger-miles during the period.

NEW B.O.A.C. POST.—Mr. Basil Smallpeice, B.O.A.C. managing director, has appointed Mr. Keith Granville, 48, to the newly created post of deputy managing director.

BURMESE VISCOUNTS.—The third and last of the Viscounts ordered by the Union of Burma Airways has been delivered. All three Viscounts are engaged on training flights but are expected to enter service soon. Meanwhile the airline has reduced its external flights to meet the demands of internal traffic. The Burmese Government have been advised as a result of a survey carried out on behalf of the Union of Burma Insurance Board that a number of airfields will have to be rebuilt to meet a standard which will satisfy insurance companies.

SOBELAIR PLANS.—The Belgian company Sobelair, which already operates air coaching services from Brussels to the Belgian Congo, is proposing to organize a network of local services in the Congo serving the smaller towns and communities. Such a service is already in existence between Stanleyville and some townships which lie 100 miles to the north. A Cessna 310 is used.

GARUDA CONTRACT BROKEN.—K.L.M. has been informed by the Indonesian Government that the contract concluded between them in 1950 whereby K.L.M. provided technical assistance to Garuda Indonesian Airways, has been cancelled. At the end of 1957, 293 K.L.M. personnel, including 141 aircrew, were attached to Garuda.

ALASKA - SOVIET SERVICE.—Alaska Airlines has asked the C.A.B. to approve operation of a commercial air service to Russia across the Bering Strait. The airline would like to fly tourist services from Alaskan towns to Irkutsk, in south-east Siberia, and intermediate points.

ROME-MOSCOW LINK.—An air service between Rome and Moscow has been discussed recently in Italy with Soviet authorities. No details are known at present.

AIR-INDIA FLEET CHANGE.—Following sale of their three L-749A Constellations to a Mexican airline, Air-India International have arranged to purchase two L-1049Gs, for delivery in mid-1958. The fleet will then comprise five L-1049Es and five L-1049Gs.

AERLINTE ATLANTIC PLANS.—Aerlinte, associate company of Aer Lingus, has concluded an agreement with Seaboard and Western Airlines with a view to chartering aircraft to open an Atlantic service. The proposed service would terminate at Shannon but the aircraft might fly on to Dublin—technically on charter to Aer Lingus—if traffic demanded.

C.P.A. BRITANNIA FLIES.—The first of five Britannia 314s under construction at Belfast for C.P.A. made its first flight from Sydenham Airport on January 11. Short Bros. and Harland will be responsible for the complete production flight test schedule on the C.P.A. Britannias and will also handle clearance of the Bendix RDR-1 airborne radar on the first aircraft.

FUEL FOR L.O.T.—The Polish Air Line L.O.T. has now obtained a licence for the import of high octane fuel for its fleet of Convair 240s recently acquired from Sabena. Fuel available in Poland is of rather low octane and unsuitable for the American engines. L.O.T. has recently ceased operating on three internal routes in Poland for economic reasons. Until November, 1957, fares on internal routes benefited from a 50% government subsidy; this has now been withdrawn.

N.Y.A. PLANS.—We are informed by William C. Wold Associates that they have been appointed to handle the sale of New York Airways' entire fleet of three Sikorsky S-58 and five S-55 helicopters, complete with tools, spares and associated equipment. N.Y.A. have recently been studying the twin-rotor Vertol 44C and are understood to be planning to re-equip with this type.

LONG SERVICE YORKS.—After 13 years of service, the last B.O.A.C. York was handed over to Skyways on November 22, 1957. No other type of aircraft has served, either with B.O.A.C. or Imperial Airways, for so many years. They began regular operation on passenger services on April 22, 1944 (opening the U.K.-Cairo route) and continued in this role until October, 1950, when the last York passenger service, between Santiago and Nassau, was flown. B.O.A.C. records show that their Yorks flew 226,996 hours (190,372 revenue hours), covered 44 million miles and carried 90,000 passengers.

MILITARY AVIATION AFFAIRS

M.E.A.F. MERGER.—The air headquarters of R.A.F. Levant, Nicosia, which is responsible for the operational control of a number of stations in the northern area of the Middle East command, will become part of Headquarters, M.E.A.F., on April 1, 1958. Some of R.A.F. Levant's responsibilities have been taken over by British Forces, Arabian Peninsula, which has its headquarters at Aden.

R.C.A.F. CUT.—The Refresher Flying Training Plan, which has provided ground and flight training on light aircraft to former R.C.A.F. pilots since 1950, is to be discontinued at the end of March, 1958. Training has been given by civilian flying clubs on Chipmunks provided by the R.C.A.F.

R.AUX.A.F. DISBANDMENT.—Air Vice-Marshal H. P. Fraser, A.O.C., No. 12 Group, was the reviewing officer at the disbandment parade of No. 3621 (North Lancashire) Flying Control Unit at R.A.F. Squire's Gate earlier this month. Three F.C.U.'s in Lancashire are to be disbanded.

M.E.A.F. LOSS.—No. 114 Sqn., equipped with Valettas, has been disbanded in Cyprus. Formed in 1917, the Squadron carried paratroopers to Port Said last year.

MISSILES FOR ITALY.—In addition to Honest John and Nike missiles from the U.S.A. the Italian Air Force is also to receive Martin Matadors.

RED GUNNERY.—Russian fighter pilots recently competed in annual air firing trials, for which a challenge trophy is awarded. All types of gunnery are included, with ciné film and live ammunition, and the trials include the high-altitude interception of a rapidly moving target. A new towed target used for Russian air firing was illustrated in our previous issue.

FIRST VISIT.—A Douglas C-133A landed at the U.S.A.F. Base at Burtonwood, Lancs, on January 12, after a direct flight from Dover A.F.B., Delaware. It is the first visit to this country by a C-133A, the World's largest military transport. It was on a routine flight and left the following day to return to the U.S.

LEAVING FIGHTER COMMAND.—The operation of R.A.F. Biggin Hill as a fighter station was due to finish yesterday, January 16, when the Standard of its one remaining Fighter Command Squadron—No. 41—was to be handed over to No. 141 Squadron from R.A.F. Coltishall, which is assuming the number of No. 41 Squadron. The Biggin Hill Battle of Britain Memorial Flight is being transferred to another Fighter Command station. This picture, taken in July, 1957, shows a Hurricane, three Spitfires, and a number of Hunters and Javelins.

AIR TRANSPORT

The New Atlantic Turbojet

A FEW additional details, and the first illustrations, of the Vickers V.C.10 were made public on Tuesday (January 14) when B.O.A.C. signed their contract for 35 of these aeroplanes. The most important news is that the V.C.10, designed for B.O.A.C.'s Eastern and African routes, has now been developed into an aeroplane suitable for service on the North Atlantic route.

As had been expected, Vickers and B.O.A.C. have decided in favour of rear-fuselage mounting of the four Rolls-Royce Conway by-pass engines, although this layout was adopted only after extensive design studies had been made to investigate the alternatives. The engines are mounted four-abreast, each pair being carried on a stub-wing. The model shows that noise suppressors are fitted on all engines; thrust reversers will also be used, although problems of airflow around the tail unit may limit them to the outboard engines only.

The fuselage shape of the V.C.10 is reminiscent of the Vanguard, with the same double-bubble to provide ample freight space beneath. To provide comfortable six-abreast accommodation, the diameter has been increased to about 130 inches. The length overall appears to be about 150 ft.—precise dimensions have not yet been revealed by Vickers. Maximum accommodation is stated to be 152 passengers in extra high density seating, up to 135 in standard high density and 108 in a first-class arrangement.

The wing appears to have a sweep-back of about 40 deg., and, with no engine installation problems, it will have been possible to design for a very favourable lift-drag ratio. The tailplane has variable incidence.

When B.O.A.C. first drew up their requirement which the V.C.10 was ultimately chosen to fill, they wanted an aeroplane of high performance to serve on their Eastern routes, the Boeing 707-420 having already been selected for the North Atlantic service in the early 1960s. The most important requirement was the aircraft's ability to operate from limited-size airfields at high altitudes and hot temperatures, and it was not at first thought possible that this could be combined economically with the very long range necessary for Atlantic operations.

Since the outlines of the design were completed, however, developments in the power of the Rolls-Royce Conway and refinement of the airframe design have opened up the possibility of Atlantic service. It will, therefore, become competitive with the later models of the American turbojets—and consequently, as Sir George Edwards said last week—must offer distinct improvements. This, Sir George went on, it does. "Although it has a higher cruising speed, the significant advantage over its American competitors lies in its ability to carry substantial payloads over long distances on routes served by or including 'difficult' airfields. This will result in improved flexibility of operation and therefore better all-round economy. It is also certain that the rear-mounted engines will provide a much higher standard of passenger comfort than is possible with wing-mounted engines."

The B.O.A.C. order for 35 aircraft, with a total value of £60 million excluding spares, is the biggest ever placed with a British aircraft manufacturer, and is backed by an option on a further 20 V.C.10s. The first aircraft is to fly in the late summer of 1961; deliveries to B.O.A.C. will begin in 1963 and will be spread over 1964 and 1965. The project is wholly financed by Vickers.

Progress with the A.W.650

ACCORDING to present plans, the first Armstrong-Whitworth A.W.650 should begin its flight trials before the end of the present year. As the decision to proceed with this wholly private venture turboprop freighter design was not taken until the autumn of 1956, and detail design did not begin until early in 1957, completion of the aircraft on schedule will be a considerable achievement. Earlier this month we visited the A.W.A. works at Baginton and Whitley, in Coventry, to see for ourselves what progress was being made.

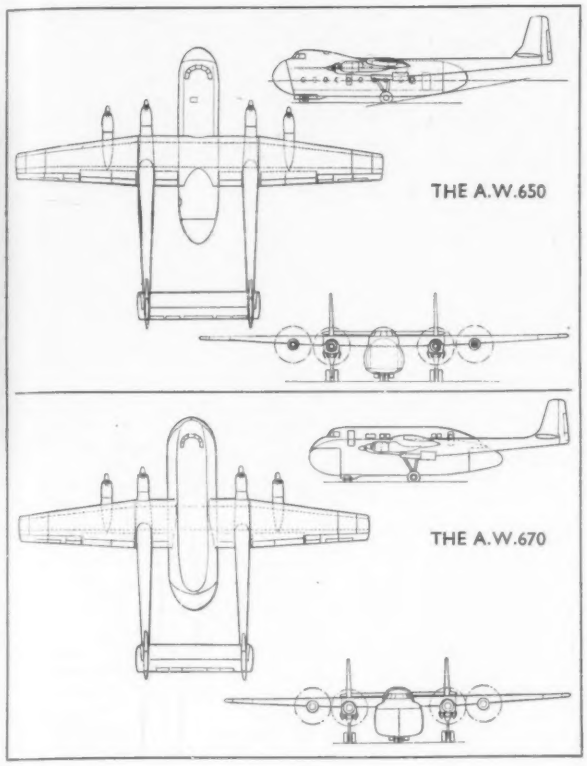
By December, 80% of the drawings had been issued to the shops and parts for the first three aircraft were in manufacture. These will be prototypes, largely hand-made, and will be followed by a pre-production batch of seven; the whole of this ten-aircraft programme is being financed by Hawker Siddeley Group at a probable cost of £5-£6 million. The project is very much a group undertaking, and is in fact a good example, as well as the first, of how an aeroplane can be jointly designed and produced by several companies. For instance, A. V. Roe are responsible for the detail design and construction of the wing, and Gloster have similar responsibility for the tail unit, flaps and other smaller components. The entire Dart powerplant, back to the firewall, is to be purchased complete from Vickers and will be a standard Viscount 810 unit—but with larger Rotol propellers. Responsibility for all associated ground equipment has been vested with A.S.T., and various accessory companies are sharing the work on undercarriage, hydraulics, cabin conditioning and so on.

The fuselages and booms are being built at Baginton and all components will be brought together at Bitteswell, between Coventry and Rugby, for final assembly and flight test. (There is no runway at Baginton itself—although A.W.A.-built Lancasters and Lincolns were test flown there.) The fuselage of the A.W.650 is compounded of two sides and bottom and top panels, with five panels making up the total length. Each of these panels is jig-built and then brought together in one of two identical fuselage jigs; the first of these is in use and the second nearly complete.

A great deal of the work at present is concerned with testing. By the end of November, structural testing and wind-tunnel tests were both 60% complete and systems tests were 38% complete. During 1957, 560 hours of testing were completed in the A.W.A. low-speed tunnel, and drag tests began in the N.P.L. compressed air tunnel. Additional wind-tunnel testing is also being done by A. V. Roe. About 80 separate tests have been initiated to date in the overall test programme associated with the A.W.650, and various rig tests have also been started covering ditching (in the Saro tank), Napier Spraymat de-icing, Standard aerial tests and fuel, hydraulic and cabin air systems.

A 10-ft. fuselage test specimen has been built and has completed the first phase of structural testing for stress distribution. Windows and a door are now being cut in this specimen for the next stage of testing. The first complete fuselage assembled will be used for static testing, and the fourth fuselage and wing will undergo extensive fatigue tests.

The space mock-up, comprising the whole fuselage and part of the centre section and boom assembly, is complete, and is being used primarily at the moment to finalize the cockpit layout. Alongside, a second mock-up of the flight deck is being made to study the American layout—C.A.A. require a separate station for the flight engineer as the weight is above



80,000 lb. In this version, the engineer will replace the radio operator in the basic arrangement.

Layout of the cockpit will be substantially as shown in the photograph printed here, although some detail refinements may still be made. This basic layout provides for the Smiths Flight System to be used. Engine instruments are on the central panel and the throttles, ground fine pitch levers and H.P. fuel cocks are on the central pedestal. A.W.A. have rejected any linkage of the propeller ground fine pitch operation with the nose wheel. Instead a gated lever is provided between each bank of throttles; this lever cannot be pulled back with the throttles, but has to be lifted through the gate in order to withdraw the flight fine pitch stop.

Typical of the thought which has gone into the cockpit of the A.W.650 is the arrangement of the engine emergency switches—feather, fuel off and fire extinguisher—in a row so that they can all be operated, if the occasion should arise, by a single movement of the hand, continuing down from pulling back the H.P. fuel cock. Other useful features, which seem to be based on practice with the Britannia, are the diagrammatic presentation of fuel contents gauges and warning lights, and electric system indicators, which show where the fuel and electric current, respectively, are coming from and going to, and where any faults may be at a given moment.

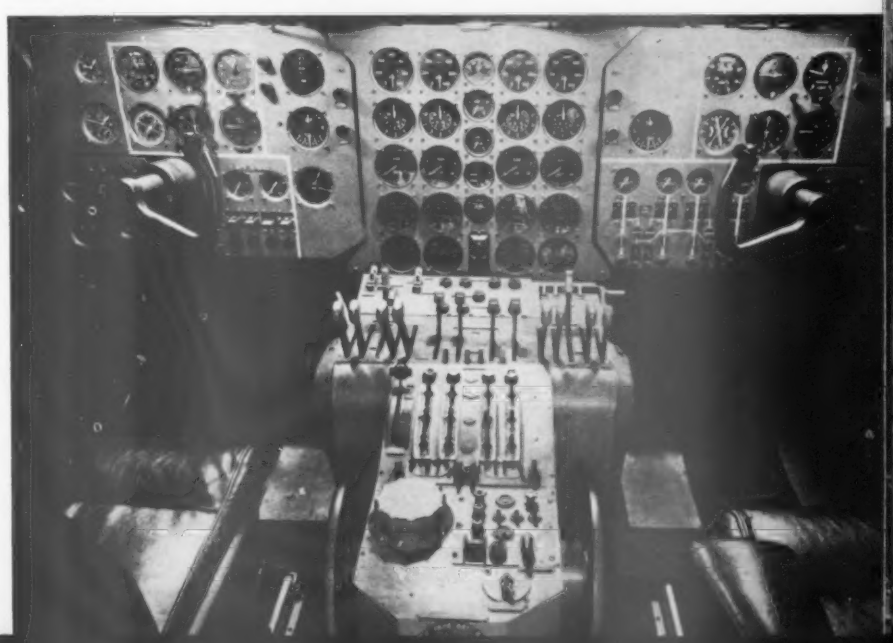
Other features shown in the mock-up are the arrangement of toilet facilities for passengers and crew in the rear and front doors respectively, and the constant cross-section of the fuselage over its whole length between doors. The doors themselves will be operated mechanically—in the first aircraft at any rate—but have hydraulic locks. Flaps, undercarriage and brakes are hydraulically operated from a 3,000 p.s.i. system.

All the work at Baginton to date, covering production and mock-up, is related to the A.W.650, which is the basic aeroplane with four Dart 526s (R.Da.7/2s). Alternative proposals with two Tynes are not being pursued very actively at present, but the wide-fuselage A.W.670 is creating a good deal of interest especially in the car-ferry role, and this version is being worked on in the design office and wind-tunnel. The shape of this wide fuselage has recently been altered (see accompanying general arrangement) to permit side-by-side loading of the six cars in three pairs.

The present intention is that the first 10 aircraft should all be 650s, but, if an order is obtained for the 670, one of the last of this pre-production batch could usefully be completed with the wide fuselage. In general terms, the three prototypes will be used through 1959 and the first half of 1960 to obtain full A.R.B. and C.A.A. type certificates, the target date for this milestone being mid-1960. From mid-1959, the first pre-production 650 should be available for sales and demonstration tours and route proving, and the next aircraft (i.e. the fifth) will be completed to the American standard and will be used also in obtaining the C.A.A. certificate.

The last five aircraft of this batch—all of which should have flown by the time the type obtains full approval—will be available for preliminary handling and familiarization trials by operators. The production plan envisages one aircraft every two months to begin with, from the first prototype onwards, and this rate should be doubled by the middle of 1960. Thereafter, the production rate depends on orders.

Initially, the A.W.650 will be submitted for certification at a gross weight of 82,000 lb. with four Dart 526s rated at 2,100 e.h.p. A little later, the fully-rated 2,655 e.h.p. Dart R.Da.10 will become available, and with these engines there seems no reason to believe that the weight of later variants of the aircraft will not rise eventually to as much as 100,000 lb. Such a weight increase might also be associated with a new wing. In the first instance, as a justifiable measure to save time, the basic Shackleton wing structure is being used—but with new flaps, ailerons, tips, leading edge and fuel system. The latest shape of the A.W.650 wing is shown in the accompanying drawings.



Layout of the cockpit is now being finalized in the mock-up of the A.W.650 at Baginton. The company has been in close consultation with B.A.L.P.A. and with prospective operators in designing this layout, which has some interesting features. Visible in this picture are the four fuel contents gauges, left of, and behind, the starboard control column; these gauges form part of a diagrammatic display which includes magnetic indication to show which tanks are feeding to which engines. On the central pedestal, between the two banks of throttles, are the H.P. fuel cocks, and the emergency switches associated with each of these can be seen aligned (in plastic channels to guide the finger behind the cocks.

Safari Service—New Style

by

H. A. TAYLOR

THE new Viscount Safari service to West Africa, which was opened by Airwork and Hunting-Clan last week, is an interesting one for two reasons. It is, in fact, the first inter-continental tourist-class service to be operated by a British independent carrier; and it is the first service to be operated by turboprop aircraft on the West African routes.

In this article we shall give some preliminary impressions of a flight on the inaugural out-and-home run between London and Accra, Ghana; next week we will deal with some of the navigational-aid, diversion, "political" and other points of interest concerning the new service.

Unlike the Viscount Safari services to Nairobi and Salisbury—which, though flown now with up-to-date equipment, remain Colonial Coach-type operations—the new service to the African west coast is a tourist-class service. This change followed, as a matter of necessity, when Ghana became an independent Commonwealth country and the cabotage freedom, therefore, no longer applied. The British Government permitted Airwork and Hunting-Clan to continue their Safari services on a new basis and on the understanding that the ton-mile capacity offered would not exceed 30% of that of B.O.A.C. on the same over-all route. This ruling, and its possible future effects, will be discussed in a later article.

Since it is flown with the faster and longer-haul Viscount—in place of the Vikings which were used until the turn of the year—the principal difference for the regular passenger on the West African Safari concerns the night-stop arrangements. Whereas the Viking service was flown via Biarritz, Tangier, Agadir, Villa Cisneros, Bathurst, Freetown and Takoradi (with two night stops, at Tangier and Bathurst) the Viscount service is flown with only one night stop and over longer stages, though the time spent in the air on each day is approximately the same.

The refuelling points on the Viscount Safari are Lisbon, Las Palmas (Gando), where a night stop is made, Bathurst and Freetown. In fact, only one refuelling stop might need to be made between the Canary Islands and Accra if the service was, from the traffic point of view, a "through" one, but both Bathurst (Gambia) and Freetown (Sierra Leone) are essential traffic stops. Takoradi (near Accra) is no longer taken in on the new Safari service. Some of the problems involved in planning the operations over the section of the route south of Lisbon will be among those discussed in the later article.

The Viscounts used by Airwork, who made the first out-and-home run last week, are the two 736s originally bought by Fred Olsen, of Norway, and which have recently been used by Middle East Airlines and British West Indian Airlines. Hunting-Clan's aircraft are those which were originally purchased by this operator, but which have since been leased to M.E.A.

The aircraft in which we flew (G-AODG) is a 53-seater and is (at least for the present) exactly as originally laid out and equipped for Fred Olsen—though the external styling has been fully modified to the latest Airwork pattern. The passenger cabin layout is interesting and, in many ways, very practical.

The seats are all forward-facing—in five-abreast groups except for the forward and aft rows; the galley (which is very reasonably capacious) is immediately forward of the rear pressure bulkhead; and there are two lavatories, one aft and one forward. The flight deck has a radio operator's station facing aft behind the first officer's position and there is a jump seat behind and between the two pilots. At present (and apart from any additional pilots who may be on board to be brought up to date on the route or on the Viscount) the flight crew consists of two pilots, a radio operator and an engineer. Later it is probable that, with the use of HF/RT, the service may be flown on a two-crew basis and that engineers will be disposed at various points on the route, so that it will not be necessary to carry one on the aircraft.

The West African operation—though comfortable and pleasant enough for the passengers—is, like other Safari services, a hard one for both flight and cabin crew, though they bear up extremely well and show no obvious signs of tiredness. It is flown out-and-home with one crew, so that they have four successive days of duty, broken by three periods (including the overnight turn-round at Accra and the night stop in each direction) in which the flight crew have their statutory rest. The entire operation is, therefore, necessarily planned around the present flight-time limitations—and these, as we found on the inaugural service (following a start delayed nearly two hours by some confusion over the passengers flying with the official Ghana party), can cause cumulative delays which upset both the schedule and the diversion plans.

We made the total journey in a flying time which, in spite of the fact that it was an inaugural service, was only 20 minutes or so over that scheduled, and turn-round times will, with practice and with more equipment at the stops, be made shorter—so there should be no difficulty in maintaining the schedule. Experience will show—and experience will undoubtedly make this new tourist-class Safari service something of a stop-watch affair.

There is much that is especially attractive about the old-time features of a Safari service. Air travellers have forgotten, for the most part, the "family" atmosphere of long-distance flying in the old days—when both flight and cabin crew stayed with the aircraft throughout a journey and were with them during the night stops. The slip-crew system has done away with all that. But, hard though it may sometimes be for the crew, this old-fashioned feature of the Safari services is liked by the passengers—who, in spite of coach journeys and the business of packing and unpacking, also like the idea of a night stop or two to break the long journey. The speed and modernity of the Viscount keeps the flight crew rather more busy than they were in the Vikings and there are fewer stops, so the family feeling is not, perhaps, quite as pronounced as it was in earlier Colonial Coach operation—but it is still there.

Bathurst, a previous Safari-service night stop, is now, with the Viscount, only a refuelling and traffic point. For many outward-bound passengers, Bathurst will provide a first experience of West African atmosphere.

Photographs copyright "The Aeroplane"

Middle East Air Transport—2

Last week, we published the first part of the article by VICTOR L. G. GORE, *in which he described the background to air transport development in the Middle East. In this concluding instalment the author discusses the various operators in greater detail.*

IN terms of type of ownership, the Middle East airlines present a very mixed picture. In Iraq and Saudi Arabia they are Government-owned enterprises; in Lebanon, Syria and Jordan they are in private ownership; in Egypt and Israel they are of mixed structure, with Government controlling interest. It is not easy, however, to draw clear lines of demarcation, as in a number of instances public corporations and semi-governmental bodies hold important stocks in these enterprises.

International competitive interests find their reflections in the various affiliations of Middle East operating companies. American transport interests have sought to find an association with local enterprise—as in the case of P.A.A. with Middle East Airlines, T.W.A. in Iran and Transocean with Air Jordan. British interests, as represented by B.O.A.C. and B.E.A., have affiliations with M.E.A., Aden Airways, Iraqi Airways, Arab Airways, Gulf Aviation, Cyprus Airways and, more recently, in Turkey.

Situated 40 miles from Turkey, 60 from Syria and 260 from Port Said, Cyprus is a natural focal point of intra-regional traffic. This geographical location is further enhanced by the island's aloofness from the Arab-Israel conflict which made it possible for Greek, Turkish, Lebanese, Egyptian, Jordanian and Israeli airlines to operate either terminating or transiting services.

Formed in 1947 as a joint Government and private interests' venture, Cyprus Airways had the benefit of technological and material co-operation with Britain's air transport Corporations and its gradually expanding services are useful feeders of the major British trunk system.

Egypt's air transport enterprise, Misrair, maintains a network of domestic and intra-regional services and, whilst originally sponsored by Airwork of Britain, it is now entirely Egyptian owned. During 25 years of its existence the company had to weather a number of organizational cataclysms, such as a Government take-over during World War II, the elimination of the British interest, the expansion of services and their reduction, the absorption of another Egyptian company, the "Saide." At the same time, Misrair lost the position of practical monopoly it enjoyed on intra-regional routes before the establishment and expansion of competitive air-operating companies in other Arab countries.

Israel's air transport has reached out farther afield than that of other Middle East countries and has the distinction of being the only indiginous enterprise operating across the Atlantic. International operations are confined to El Al Israel Airlines—a "chosen instrument" company formed in 1948 by the Government, the Israeli shipping company "Zim," the General Federation of Labour and the Jewish Agency. Operations started in 1949 to various points in Western Europe.

The exuberance of youthful inexperience might have been responsible for an early stretching of the route network to the south as far as Johannesburg, and to the north-west to New York, with a galaxy of points being served in Europe—all relying on four well-matured aircraft, for which sacrifices had to be made in terms of punctuality and reliability of scheduled timetables. Current efforts of administrative reorganization open a new period of consolidation and the recent introduction of Britannias into El Al's services will give them an all-important advantage.

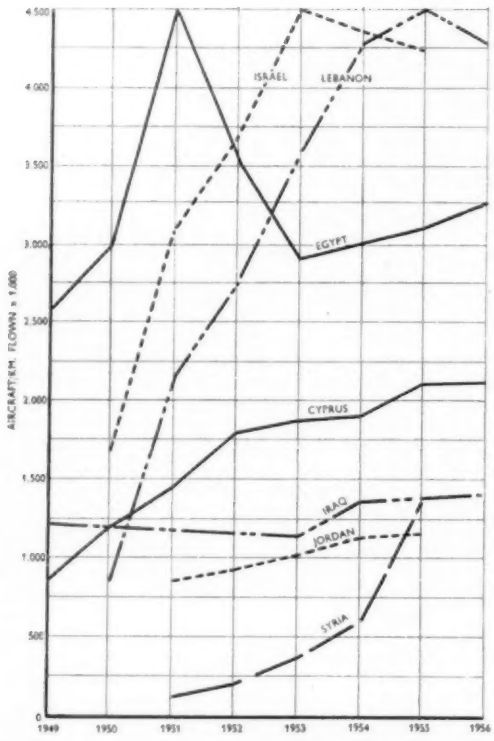
Despite the smallness of the country, Arkia, Israel's domestic airline, proved to be an outstanding success. This is due to no small extent to the Government's policy of developing Elath, Israel's only outlet to the Red Sea, and the consequent underwriting of that operation during the formative period of that company's operations. Operating an unduplicated network of only 380 km., Arkia's mainstay of operations is the service to Elath, which is only sparsely connected with other centres by surface transportation.

Across the Jordan two enterprises contend for local and regional traffic—Air Jordan, which operates an unduplicated route network of 987 km. and serves Jerusalem, Amman, Cairo, Beirut and Kuwait, and Arab Airways, with a network of 2,285 km. linking Jordan not only with Lebanon and Egypt, but also with Iraq, Aden and Saudi Arabia. A serious handicap to the sound development of Arab Airways was the competition from carriers of other Arab countries in the area operating parallel services, notably that of Air Jordan, which at times used superior equipment.

True to their ancient heritage of Phœnician enterprise, the Lebanese have kept air transportation open to commercial enterprise. Middle East Airlines operate an extensive network of 16,250 route-km. and link Beirut with points in Egypt, Iraq,

Beirut is at the centre of air traffic in the Middle East, providing direct connections to all other principal cities in the area. This view from the Beirut control tower shows the maintenance area, with two DC-3s and a DC-4 of the local operator, Air Liban, visible among others.

Photograph copyright "The Aeroplane"



Although the operations of the Middle East airline companies show a general upward trend, there are considerable fluctuations, some of which result from political factors.

Iran, Italy, Switzerland, France, Greece, Germany, Austria, Saudi Arabia, Syria, Turkey and the U.K. Air Liban, the other Lebanon-based carrier, connects Beirut with eight areas in the Middle East and four in Africa—the latter following the traditional path of Lebanese traders to Khartoum, Fort Lamy, Lagos and Accra.

In Lebanon's uneasy neighbour, Syria, the Syrian Airways operate a network of 4,819 km., regional services connecting Damascus with Baghdad, Cairo, Beirut and Kuwait, and one internal service. Formed in 1946 by private interests, the company had to suspend operations two years later owing to a financial crisis. In 1951 Government financial assistance came to the rescue and operations restarted at first on the domestic network and later on intra-regional services.

Centred on Baghdad—for long a focal point of communications in this region—are Iraqi Airways. Founded in 1945 as a subsidiary of the State-owned Iraqi Railways, the company started operations in 1946; in 1951 international services were extended further with Vikings and Doves. The extent of the airline's operations fluctuated very considerably, with the network of unduplicated routes rising to 8,086 km. in 1949 and dropping to 4,016 km. in 1951. With modernization of the fleet with Viscounts the company appears to have attained a fresh impetus and the expansion of its route network reached 9,327 km. in 1956-7. At present this network links Iraq's capital with 16 localities, of which nine are on intra-regional routes, three on domestic services and four in Europe.

A comparison of operational results shows that in 1956 the six leading Middle East airlines—Air Liban, Cyprus Airways, El Al, M.E.A., Misrair and Iraqi Airways—produced together 14 times as many revenue ton/km. as in 1950.

As in some other instances in other parts of the World, the volume of air transport operations developed by a specific country does not necessarily correspond to the size of its population. While Egypt's population represents some 60% of the region's total, her share in the total ton/km. produced by Middle East operators is only 18%, and that of Iraq, representing about 14% of the total Middle East population, is 6.8%. On the other hand, Lebanon, with only 3.83% of the region's total population, accounts for as much as almost 14% of the total ton/km. performed. Finally, about 50% of the entire ton/km. output of regular Middle East air transport is performed by the airlines of Israel, the population of which is only 4.8% of the region's total.

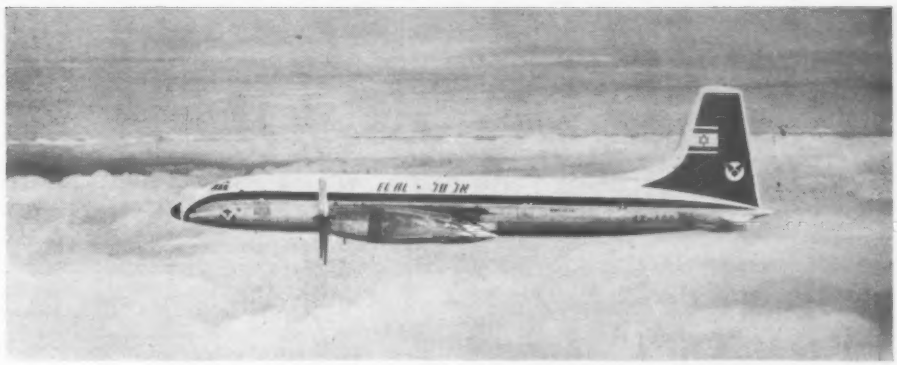
Nature of the Network

A feature of most Middle East operations is their intra-regional or international character. The existence of relatively few centres of concentration of economic activity within individual countries calls for the provision of air communications across the frontiers between important centres of population within the region. Consequently, only about one-third of the total operations of Middle East airlines is within the domestic segment, the rest being intra-regional and international; 65.5% of the total aircraft mileage flown in 1946 was in international operations and only 31.8% in domestic operations. Again, in 1953, 89.4% of revenue/km. flown by the airlines of Egypt, Cyprus, Iraq, Israel and Lebanon were in international operations and only 10.59% in the domestic sector. In 1955 the airlines of these countries flew 10 times as many kilometres on international services as on domestic ones and, finally, in 1956-7 the total of passenger traffic carried on international services of Cyprus, Egypt, Iraq, Israel and Lebanon was more than four times the number of passengers on domestic services of these countries.

The coverage of the network of services provided by Middle East operators still appears to be rather thin, despite increased density of services. While in 1946 84.6% of all services with more than one intermediary stop were operated on a frequency of less than 12 a month, the balance being equally distributed between services operated at 12 to 29 frequencies per month and those with daily frequencies. By 1954 still 80.1% of 63 Middle East services with one or more intermediary stops, operated not more than 12 times a month, 15.9% were within the 10-30 times-a-month group and only 3.18% showed daily frequencies and none more than that. Out of 50 services scheduled in spring, 1957, only three operated daily and three at more than once-daily frequency; 19 services operated at frequencies not exceeding 16 per month and as many as 19 services not more than four times a month.

An examination of intra-regional services shows up the considerable advantages of air transport as against surface carriers. These advantages become most apparent, of course, on trans-desert and across-water routes and, as it happens, the main traffic-generating centres are separated either by stretches of water or of desert. The time-saving advantage gained by air transport is, in fact, due more to these features of geography than to its efficacy and speed. For the speed at which the air

The airlines discussed in this article rely heavily upon British equipment and four of the seven are now Viscount operators, including Misrair, Middle East Airlines, Cyprus Airways and Iraqi Airways. An Iraqi Viscount is illustrated.

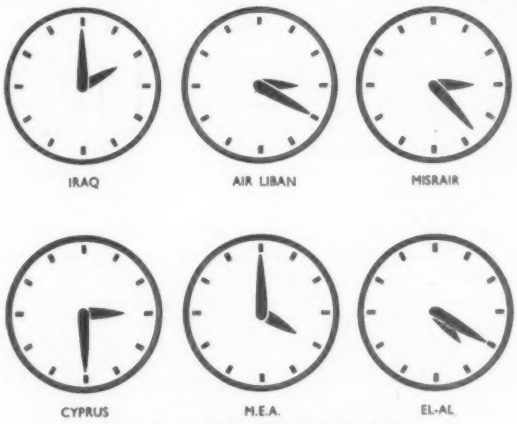


The Britannia is another British type now used in the Middle East, El Al having inaugurated services from Israel to Rome, Paris, London and New York with three of these aircraft last month.

traveller moves in the region is still within the lower bracket.

With various aircraft deliveries being made to Middle East operators the picture of equipment is very fluid. As many as 10 different types of aircraft go towards making up the fleet of these operators; about half are of U.S. manufacture, with British-made aircraft following a close second. The DC-3 is still very much in use and about 40% of the total network of 13 carriers is operated with this aircraft.

At present some 50-odd aircraft are in scheduled operations, more than half of which are twin-engine and the rest four-engine types. Of British types, in addition to a strong representation of Vikings, Herons and Doves, the Viscounts are



Daily aircraft utilization hours achieved by the various Middle East operators are shown in these diagrams.

coming increasingly into employment. DC-4s and Constellations complete the picture, which was recently altered substantially with the introduction of Britannias in El Al services. Another important change will result from the introduction—in the region's close vicinity—of Viscounts by the Turkish Airlines.

The utilization of equipment in scheduled operations by six Middle East carriers—M.E.A., Air Liban, El Al, Misrair, Cyprus Airways and Iraqi Airways—shows an average of only 300 flying hours per aircraft in the fleet per annum. Over a period of the past few years, however, most Middle East carriers appear to have been modestly successful in increasing steadily the utilization hours of their equipment; an interesting exception appears to be El Al, where exceedingly high, daily utilization rates achieved in the first years of operations might be responsible for the recent tendency to trim down utilization to somewhat more modest levels. Looking at daily average utilization rates of individual carriers, El Al still retains the lead in the Middle East with 4 hr. 20 min., M.E.A. a close second with 4 hr., followed by Cyprus Airways (3½ hr.), Misrair (3 hr. 22 min.), Air Liban (3 hr. 20 min.) and Iraqi Airways (2 hr.).

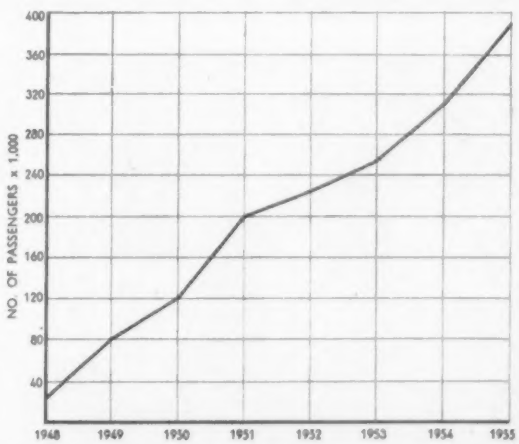
Some 3,500 men and women are employed in scheduled air transport operations of Middle East carriers. This is a relatively modest figure if one remembers that a small country like Switzerland has 3,223 employed in their national company. In fact, the total labour force engaged in Middle East air transport operations is only about one-sixth the strength of such intercontinental operators as B.O.A.C. or Pan-American.

While in Canada for each 1,533 inhabitants there is one person engaged in air transportation and in Scandinavia one in each 2,113; in the Middle East only one person in 10,949 of the region's total population is occupationally involved in such pursuits. This Middle East rate, incidentally, while much lower than that for the Argentine, is very much higher than that for Brazil, where only one person in 19,000 earns a living in regular air transport.

Related to the total fleet of Middle East scheduled operations, there are about 70 employees for each aircraft. A breakdown of this overall picture into proportions for individual carriers shows that, for each aircraft in the fleet, El Al has 122.2 employees, Misrair 112.8, M.E.A. 84.9, Cyprus Airways 46.2 and Air Liban 40.

But more indicative of the productivity of an air transport enterprise is the ratio of the output of ton/km. performed to the manpower employed. In 1956-7 these Middle East airlines, taken as a whole, produced close to 11,000 ton/km. per employee. In Canada during the same period, for each employee in scheduled operations, the output was a little over 20,000 ton/km. While the productivity rate of the Middle East labour force is thus inferior to the highly streamlined Canadian air transport industry, it is higher than the overall rate for all Asia (9,500 ton/km. per employee) or Latin-America and falls reasonably short of the old-established European system, where the output per employee is 14,000 ton/km.

And what of the future? Developments of the past 10 years show that, despite the political tremors and tensions which grip this area, the air transport industry has made some important strides. Between 1951 and 1955-6, the aggregate total of aircraft-kilometres flown by Middle East airlines in all scheduled operations increased by 36.5% and the total of ton/km. performed in these operations by 97.7%. By the end of the current year the airlines of Egypt, Iraq, Israel, Lebanon and Syria will be operating a network of unduplicated routes of over 90,000 km. and would have performed at least close to



A simple graph to show how the number of passengers in the Middle East area is growing.

17m. aircraft/km., and would have carried in 1957 more than twice as many passengers as in 1951. These increases speak for themselves.

There is little doubt that in the future, and perhaps the near future, some Middle East operators will endeavour to expand their extra-regional services and to venture, possibly, into trans-atlantic operations. The potential requirements for equipment in these segments of future Middle East operations would, therefore, appear to merit particular and timely attention, and sight should not be lost of a new potential supplier of transport aircraft—Russia.

It is evident that the existing network of domestic services in the region is, with few exceptions, still open to further expansion and development. While at present DC-3s and other vintage aircraft are doing honourable service, the time is certainly approaching when their replacement in scheduled operations and additions to the fleet will be contemplated. For some countries this might mean the provision of higher-capacity aircraft operating economically on short and medium ranges at a high frequency; in others it might be the requirement for a smaller-capacity aircraft capable of operating from sub-standard airfields in order to bring air transport closer to the gates of smaller communities.

An important sector of potential requirements for aircraft should be in freight-carrying equipment. Although freight shows some noteworthy increases—the amount of ton/km. performed in freight operations having risen by 69.6% in the past four years—it is still in its infancy. At present some 20-22% of the total ton/km. performed by Middle East operators is absorbed by freight, but only the fringes of the potential market have been touched—concentrated hitherto on the most obvious commodities. A more imaginative approach by local authorities and operators could substantially expand this segment of operations and produce important new sources of revenue. The proximity to markets starved of high-grade perishable foodstuffs in Africa and in the oil-producing arid fringes of the region, as well as the surfeit of various agricultural produce marketable in Europe, offer great possibilities and a challenge to air freight.

Market research, the investigation of specific problems of transportation of perishables, of economies and techniques in packaging and storage costs, and a closer co-operation in this field between aircraft and equipment makers, operators and marketing organizations would be necessary to exploit to the full such realistic possibilities. Large-capacity freighters capable of carrying at economically competitive rates such merchandise from Middle East production centres to Europe and elsewhere would then be readily absorbed by that region's operators.

Admittedly, the selling prospects of new types of aircraft to Middle East operators will be much influenced by the efforts of the World's larger airlines to off-load some of their current equipment. As in other parts of the World, operators will have placed before them the choice of lower capital investments for older aircraft, or considerably higher investments in more modern, faster and more cheaply operated equipment. The temptation to plunge for the former will be great, especially where no competitive motives exist for more up-to-date equipment. But it is precisely because of such deterrent factors motivating against sales of the right kind of new aircraft that their more imaginative and pioneering promotion is required.

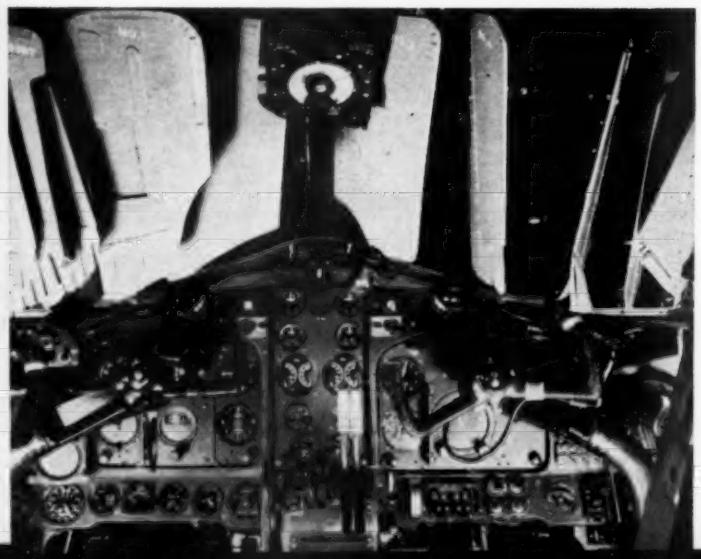
Visibility Nil

AN original system for obscuring the forward vision of pilots under instruction or examination has been developed by Capt. B. E. E. Marshall, deputy commander of the M.T.C.A. Civil Aviation Flying Unit at Stansted. Capt. Marshall became concerned with the problem of simulating cloud flying without impairing the vision of the safety pilot or instructor in the right-hand seat, soon after the Instrument Rating scheme came into use in this country in 1949. The then universal system of amber screens and blue-tinted goggles had known drawbacks—such as difficulty in seeing the instruments under certain lighting conditions or if the goggles steamed up, and the fact that the system could not be used in twilight or after dark.

Capt. Marshall experimented with various other schemes, including the "venetian blind" system used in the U.S.A., and another "shaped curtain" which obstructed the view of the examiner as little as possible. Neither of these schemes was approved by the A.R.B. The angled screen arrangement finally adopted and approved comprises a series of slatted screens and obscuring panels so arranged in the cockpit that the occupant of the left-hand seat can see nothing outside, while the view from the right is virtually unrestricted. One of the screens has a sliding panel to allow the examinee to see the runway when taking off or landing. The screens can easily be removed from their mounting clips.

Since August, 1955, the system has been used on the five Doves used by the M.T.C.A. examining section, and about 3,000 flights have been made using it. By making it possible for tests to continue after dark the screens have proved of great economy and Capt. Marshall has recently been awarded £200 under the Civil Service staff suggestions scheme for this development.

Below, a Dove cockpit with the screens in place.



John Chichester Longhurst

IN the death of John Longhurst on Christmas Eve (briefly recorded in the issue of January 3, p. 6) air transport has lost one of its more valuable and objectively minded critical commentators and statisticians—and his friends have lost a man who retained kindness and human sympathy even when he was being most incisive in his views.

After serving with Imperial Airways and B.O.A.C. between 1935 and 1943, John Longhurst joined the staff of THE AEROPLANE and was air transport editor until the autumn of 1951. During this period he edited, for three years, a companion monthly which was started to serve the special needs of the air transport industry and its associated interests.

As an aviation journalist he developed and held strong views on air transport policy. His forthright writings under the pseudonym "Commentator" will be remembered with pleasure (and, sometimes, with irritation) by those who were in the airline and airport business during the five years which followed the War.

Since 1952 John Longhurst had been a director of Aviation Studies. Rightly or wrongly his voice was one of the few which were raised in considered opposition to the timing and extent of the turbojet equipment programme planned by the World's airlines. Whether one agreed with them or not, his opinions were always based on sound, logical thinking and on the result of rigorous and extensive statistical analyses. Though nothing if not human in himself, John Longhurst's thinking was rarely influenced by emotion or sentiment. His comments were always direct and to the point.—H.A.T.

THE FIGHTING SERVICES

A.D.C. To Her Majesty

GROUP CAPTAIN H. E. BUFTON, D.S.O., O.B.E., D.F.C., A.F.C., has been appointed an Aide-de-Camp to H.M. The Queen in succession to Air Cdre. P. H. Dunn, C.B., C.B.E., D.F.C., with effect from January 7. At present Senior R.A.F. Officer, Persian Gulf, with Headquarters at Bahrein, Gp. Capt. Bufton served with the U.S.A.F. from 1951 to 1954 and then became Deputy Director of Organisation at the Air Ministry.

Two Air Commodore Appointments

GROUP CAPTAIN W. E. COLES, C.B.E., D.S.O., D.F.C., A.F.C., has become Senior Air Staff Officer at Headquarters, No. 3 Group, Bomber Command, with the acting rank of Air Cdre. Succeeding Air Cdre. M. H. Dwyer, C.B.E., who has been selected for the 1958 course at the Imperial Defence College, Gp. Capt. Coles was head of the R.A.F. element of the United Kingdom Service Liaison Staff and Air Advisor to the High Commissioner in Australia between 1953 and 1955.

The Senior Equipment Staff Officer at Headquarters, Coastal Command, since 1954, Gp. Capt. R. G. Seymour, C.B.E., has been appointed Director of Equipment (B) at the Air Ministry with the acting rank of Air Cdre. From March, 1952, until his posting to Coastal Command, Gp. Capt. Seymour served in the Far East at R.A.F. Seletar, first as O.C., No. 390 Maintenance Unit, and later as the station commander.

Otters Over the Pole

ON January 6 a de Havilland Otter piloted by Squadron Leader J. Lewis, A.F.C., leader of the R.A.F. Detachment with the Transantarctic Expedition, became the first single-engined aircraft to cross the Antarctic continent. Flying from South Ice to Scott Base via the South Pole, Sqn. Ldr. Lewis, accompanied by Flt. Lt. G. Haslop, Flt. Sgt. P. Weston and Sgt. E. Williams, took 10 hr. 57 min. for the 1,250-mile crossing.

As the second attempt to make the flight (the first was on December 30), Sqn. Ldr. Lewis took off from Scott Base at 11.52 hrs. (New Zealand time) and just over 2 hr. later passed Dr. Fuch's tractor party on its overland journey to the Pole. The Otter crew sighted the South Pole station at 16.28 hrs. after having picked up the Pole homing beacon 30 miles out, and flew directly over the station at 2,000 ft.

Sqn. Ldr. Lewis landed at Scott Base at 22.49 hrs. after being escorted for the last part of the flight by two U.S. Naval Otters that took off from the American base to meet him. The weather conditions on the flight were quite good, although there was cloud over the South Pole plateau. This was in the form of stratus, with the top layer at about 1,500 ft. above the 10,000-ft. terrain, and flying at 12,000 ft. the Otter was on top with 500 ft. separation. Over the Ross Ice Shelf the flight was made at 5,000 ft. because of the favourable wind conditions at that height.

After news of the feat had reached the United Kingdom, Marshal of the R.A.F. Sir Dermot Boyle, Chief of the Air Staff, sent the following signal to Sqn. Ldr. Lewis: "The Air Council and I have read with great admiration of your historic flight over the South Pole from South Ice to Scott Base. We send to you and your colleagues our warmest congratulations and good wishes."

M.E.A.F. INSPECTION.—Air Marshal C. E. Chilton, A.O.C., Malta, inspecting the parade of R.A.F. personnel and No. 8 Independent Recce Flight, Army Air Corps, at R.A.F. Idris during his visit to the station earlier this month. The A.O.C. is accompanied by the station commander, Wg. Cdr. W. Stapleton.

Essay Subject Changed

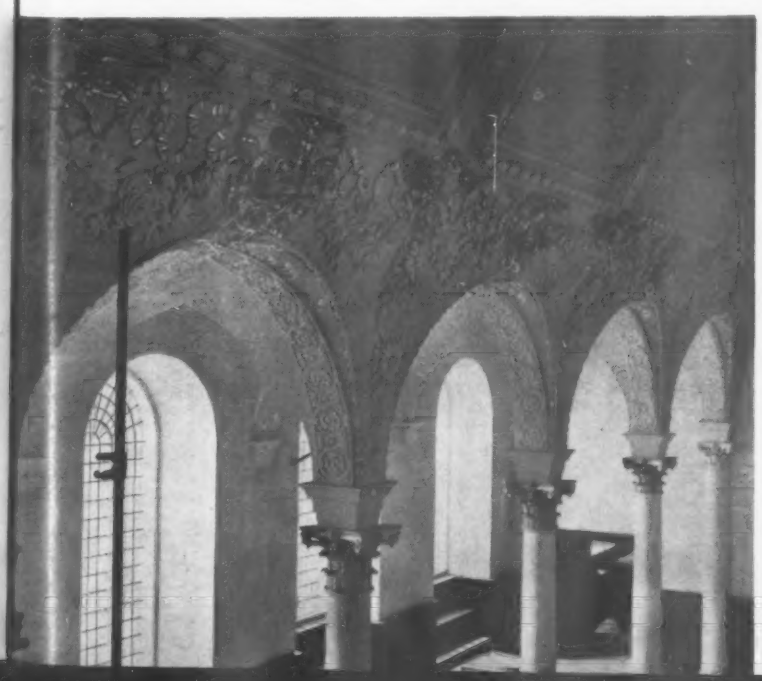
SINCE publishing the list of winners of the 1957 Gordon Shephard Memorial Prize Essay Competition and giving details of the 1958 competition in THE AEROPLANE of November 29, 1957, the subject for this year has been changed by the Air Ministry.

Instead of discussing the relative merits of naval carrier task forces and land-based aircraft, the new subject is entitled "It is the declared intention of Her Majesty's Government to cease calling up men for National Service by the end of 1960 and, by January 1, 1963, to achieve an all-regular Air Force. Discuss practical measures which would enable us to achieve this aim."

1957 R.C.A.F. Review

DURING the past year the R.C.A.F. had a number of senior command changes and introduced new air and ground equipment into service. In addition, the first supersonic all-weather interceptor—the Avro Arrow—for future operations with the Service was unveiled by the Canadian Defence Minister.

In September, Air Marshal H. Campbell took over as Chief of the Air Staff from Air Marshal R. Slemon, who had held the appointment since



RESTORED SPLENDOUR.—The rebuilding of the R.A.F. Church of St. Clement Danes in the Strand is now well advanced, as can be seen from this interior view showing the restored plasterwork.

1953. Air Marshal Slemon then became Deputy Commander-in-Chief of the North American Air Defence Command (NORAD), which has its headquarters in Colorado. This new command will provide integrated planning and operational wartime control of the aerial defences of both countries.

Another step in the build-up of North American defence was the transfer of the Mid-Canada Radar Warning Line to an operational footing. Stretching for some 2,500 miles across Canada, the Mid-Canada Line is the latest of the U.S.A.F./R.C.A.F. radar warning systems to come into service.

The first Canadair CL-28 Argus for the R.C.A.F. was delivered by the manufacturers in September, and the re-equipment of the nine Air Defence Command all-weather fighter squadrons with Avro CF-100 Mk. 5s was made during the year. Another completed task was the transfer of four CF-100 squadrons to the Canadian No. 1 Air Division in Europe, which now consists of these four squadrons and eight F-86 Sabre squadrons.

In addition to its regular commitment of scheduled domestic and overseas flights, the R.C.A.F. Air Transport Command continued to support the United Nations Emergency Force in the Middle East and operated a number of flights to Saigon on behalf of the Canadian Indo-China Truce Commission. Altogether the Command's aircraft carried over 50,000 passengers and transported more than 14,000,000 lb. of freight. The nine-year-old aerial survey programme of northern Canada by No. 408 Squadron was also completed.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Wing Commanders: L. F. Banks, D.F.C., A.F.C., to R.A.F. Waddington, to command No. 83 Squadron; K. E. W. Brace to Air Ministry for duty in the Department of the Air Member for Supply and Organization in Headquarters, Middle East Air Force; W. S. Brundish, M.B.E., to Headquarters, Maintenance Command, for administrative staff duties; I. R. Campbell, A.F.C., to R.A.F. Bruggen to command No. 213 Squadron; D. B. Fitzpatrick, O.B.E., A.F.C., to Ministry of Supply; A. L. Fussell to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; C. A. H. Goudie to Air Headquarters, Malta, for technical staff duties; C. G. St. D. Jeffries, D.F.C., to R.A.F. Binbrook as Officer Commanding, Flying; A. C. Morris, O.B.E., to Joint Services Staff College, Latimer, for directing staff duties; R. D. Stephens to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; G. H. Westlake, D.S.O., D.F.C., to R.A.F. Geilenkirchen for flying duties.

Squadron Leaders: J. Miller, D.F.C., A.F.C., to R.A.F. Flying College, Manby, for directing staff duties (with the acting rank of Wg. Cdr.); L. B. Noyes, A.F.C., to Headquarters, Eastern Sector, for control and reporting operations duties (with the acting rank of Wg. Cdr.); H. A. G. Warren to Headquarters, Arabian Peninsula, for administrative staff duties (with acting rank of Wg. Cdr.).

Reunion

No. 38 Group.—The 12th Old Comrades Association annual dinner will be held at Londonderry House, 19 Park Lane, London, W.1, on March 8, 1958. Tickets, price 25s., can be obtained from the Hon. Asst. Secretary, Mrs. L. C. Randall, Metropole Hotel, Brighton, Sussex.

George Beamish Retires

THIS MONTH Air Marshal Sir George R. Beamish, K.C.B., C.B.E., leaves the Service, and coming at the turn of a year so crucial in the affairs of his beloved R.A.F., his retirement seems to me to mark, in personal terms, the end of an era in R.A.F. history.

He is one of the notable representatives of the between-wars Air Force when the man had to show himself superior to the then more primitive machinery, to fly himself around with practically no aids, a challenge which it took stout-hearted men to meet and beat. It was, one might say, the manual, human age. Nowadays the airborne man, controlled, observed, is approaching the limit of physical endurance and mental capability. He is metered, not vectored, on to the target.

The R.A.F. of George Beamish's early days was an élite flying club small enough for every member to know almost all the other members, at least by repute. The circumstances bred "characters," some of them emerging from a wonderful series of brothers—the Cootes, the Elsmies, the Atcherleys—and the four Beamishes from County Cork: Victor, George, Charles and Cy. The first three were General Duties officers, playing great rugby for Leicester and the R.A.F., George and Charles also for Ireland, the former being capped 26 times. Cy, the youngest, is a Wing Commander in the Dental Branch and is content to be a golf international. Then there were two Beamish sisters who served in the W.A.A.F. during the War. One feels that without the support of the Beamish family, the R.A.F. might well have gone out of business. Victor was killed in the Norwegian fighting, Charles retired in 1950 to farm in Ireland, and George will join him for at least the early days of his retirement.

To complete the list of the Air Marshal's 1925-33 sporting achievements: he was R.A.F. golf champion in 1925, R.A.F. heavyweight boxing champion in 1929, and no mean tennis player. Not surprisingly his sporting activities sometimes diverted the course of his Service career. A New Zealand rugby tour in 1930 was responsible for his taking nearly three years to do the two-year engineering course at the R.A.F. Technical College, Henlow.

George Beamish in 1923 followed one course behind Dick Atcherley at Cranwell. Twenty-five years later, by a strange chance, they went through Cranwell again in the same progression as successive Commandants. A fellow cadet in Hut 17 was Lord "Paddy" Bandon, another Irishman but very different from the quiet Beamish who was awarded the Sword of Honour and went off to fly Fairey Fawns with No. 100 Sqn. George Beamish's airmanship was recognized when in 1927 he qualified as a flying instructor at No. 3 F.T.S.; his technical ability saw him through Henlow with honours in electricity.

With the aeroplanes of the '20s it was often possible to do outrageous things and to live and laugh afterwards. For instance, on Henlow's Virginias used for parachute training, the parachutee stood on a strut-mounted lower wing-tip platform, pulled the rip-cord when signalled by the pilot, and the opening parachute broke the man's desperate grip on the strut. Unless you were a Beamish!

The Air Marshal's career was solidly progressive — Middle East, Staff College, Air Ministry; Crete, Desert Air Force, U.K., Canada; bombers, transports, staff jobs. Of his first post-War appointment, as President of the R.A.F. Selection Board, it has been said that his soft Irish voice, unusual in so massive a frame, reassured many a nervous young man. In 1954, C.-in-C., Transport Command, then for the last two years C.-in-C., Technical Training Command, than which there are now few more important Service appointments. A fine sportsman, a first-class officer, a man of kindness and integrity. One of the great "characters" who set the high standards of the R.A.F.'s formative years, he will agree that the R.A.F. has changed, but that it's just as good in a different way. The "character" of 1958 flies at 1,000 m.p.h. at 50,000 ft., in machinery which costs a quarter of a million or more and which lands at 150 knots. We have moved in a Service lifetime from Beamish to Beamont. I wonder how long the next step, from Beamont to beam, will take.—WREN.

The DC-8 in Production

WITHIN the next two or three months, the first Douglas DC-8 is expected to make its first flight at Long Beach, California. The original schedule was for the first flight to be made in March, 1958, and according to recent Douglas statements, production is "on schedule." Although beaten into the air by the Boeing 707, the Douglas DC-8 has, in fact, been put into production much more rapidly than the 707, and without the advantage of large-scale, large-turbojet experience which Boeing had with the B-47 and B-52.

In THE AEROPLANE for May 31, 1957, we described the new Long Beach factory which Douglas have built for DC-8 production, following a visit there by a member of our staff. At the time of that visit, still less than 12 months ago, the two massive assembly halls and associated buildings, with a total floor area of 1,130,000 sq. ft., were in the final stages of completion. The formal dedication and opening was on May 10, 1957; ground had been broken for this factory on April 2, 1956, and fabrication of DC-8 parts began—in the old Douglas factory at Santa Monica—in September, 1956.

We print overleaf a selection of pictures showing the DC-8 in production. They are worthy of special study for they illustrate some of the advanced techniques which Douglas have adopted—thanks, in part, to the size of the new building which has allowed Douglas engineers to break the structure at the optimum points and not where dictated by existing production bays, floor strengths, etc.

The notes on production which follow were prepared specially for THE AEROPLANE by Douglas to accompany these illustrations. They can usefully be read in conjunction with the earlier article already mentioned.

Special machines for mass production of fabricated parts were installed for DC-8 assembly. A 720,000-lb. stretch press, for example, is used to form the airfoil contour immediately following the dihedral break operation of the inner wing skins. This massive press, 36 ft. long, 18 ft. wide and 14 ft. high, is the largest of its type on the Pacific Coast. It has four stretch jaws with a rated stretch tonnage of 300 tons per jaw, each jaw being independently operable. The upper retention unit exerts a 2,400-ton clamping force against the part.

A milestone in the production of the DC-8 jetliner was passed on October 25, 1957, when the first fuselage and wing were joined, on schedule, in two and a half hours.

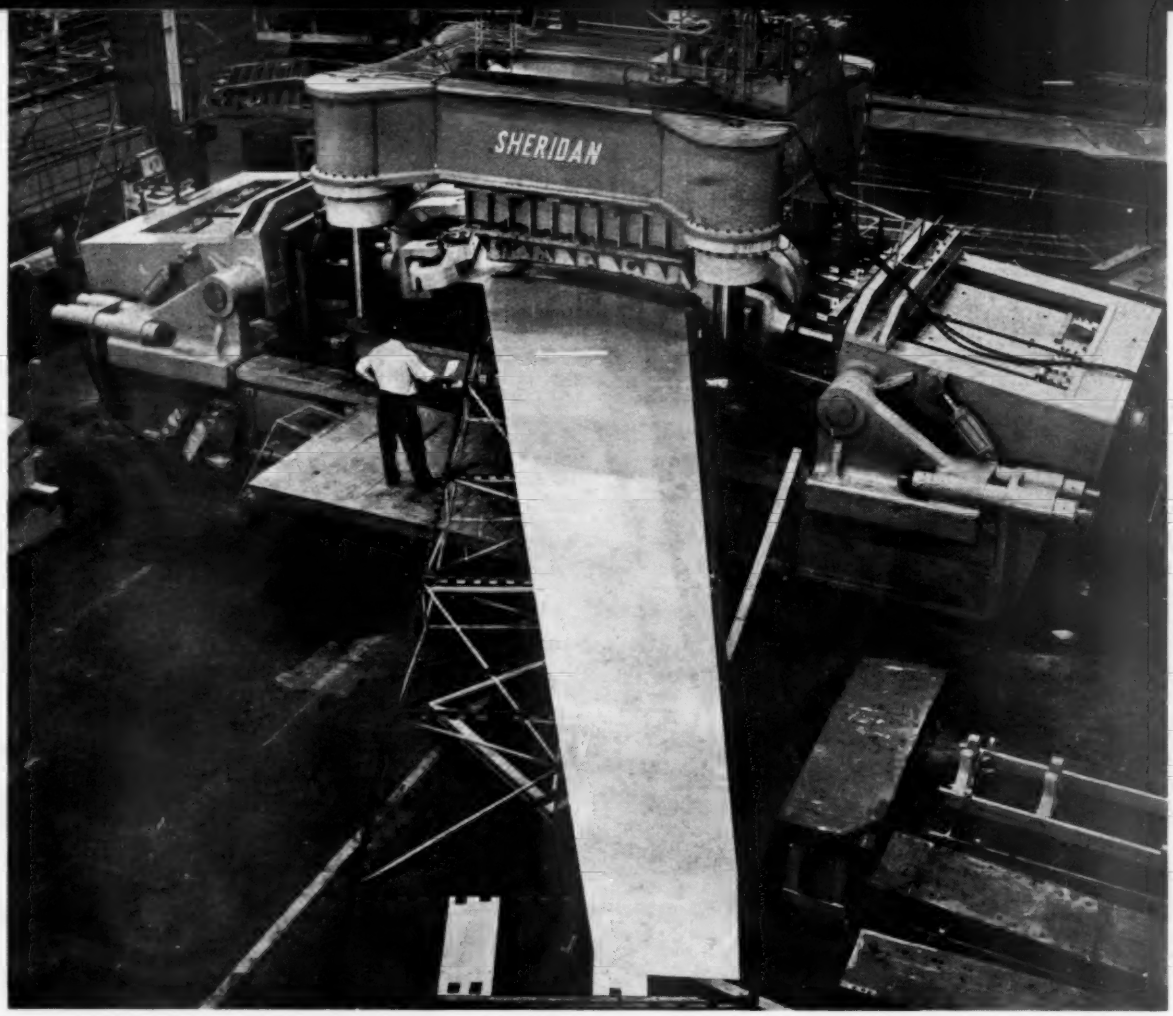
The DC-8 has an integral-fuel-tank wing, with typical Douglas three-spar construction. After spar assemblies are completed, they are carried on slings to the wing tank jig. This massive jig, one of the largest at Douglas, is 80 ft. long and has three working levels. It can accommodate two sets of wings simultaneously, each of which can be drilled and riveted from front to rear spar without being moved. For efficiency, working crews are alternated, with drilling operations being performed on one set while riveting is accomplished on the other. The extensive venting system assures safety and comfort of the workers.

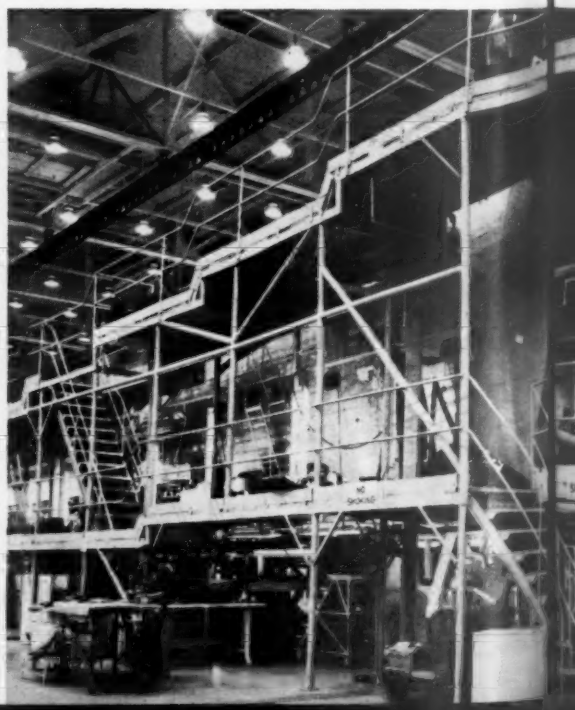
After the wing sections are assembled in the wing tank jig, they are lifted out and placed in another assembly jig where the trailing edges and flap fittings are attached. The wing, which has a 30° sweepback, is completed by joining the two sections at the centre line of the aeroplane.

There are four major sections to the DC-8 fuselage. The

(*Continued on page* 82)

These two pictures show the first DC-8 at the mid-point of the final assembly line. This line, in the final assembly shed, is U-shaped, the turn at the bottom of the "U" being made outside the hangar. On the first leg of the "U"—which the DC-8 is seen leaving in the upper picture—fuselage and wing are mated, and undercarriage, engine pylons and fin are attached. On the second leg, which the aircraft is seen entering in the lower picture, wing leading and trailing edges will be added, the tail unit completed, engine pods installed and basic furnishing completed. This aircraft and the next few on the line are all part of United Air Lines' order for 40, deliveries of which are to begin in May, 1959.

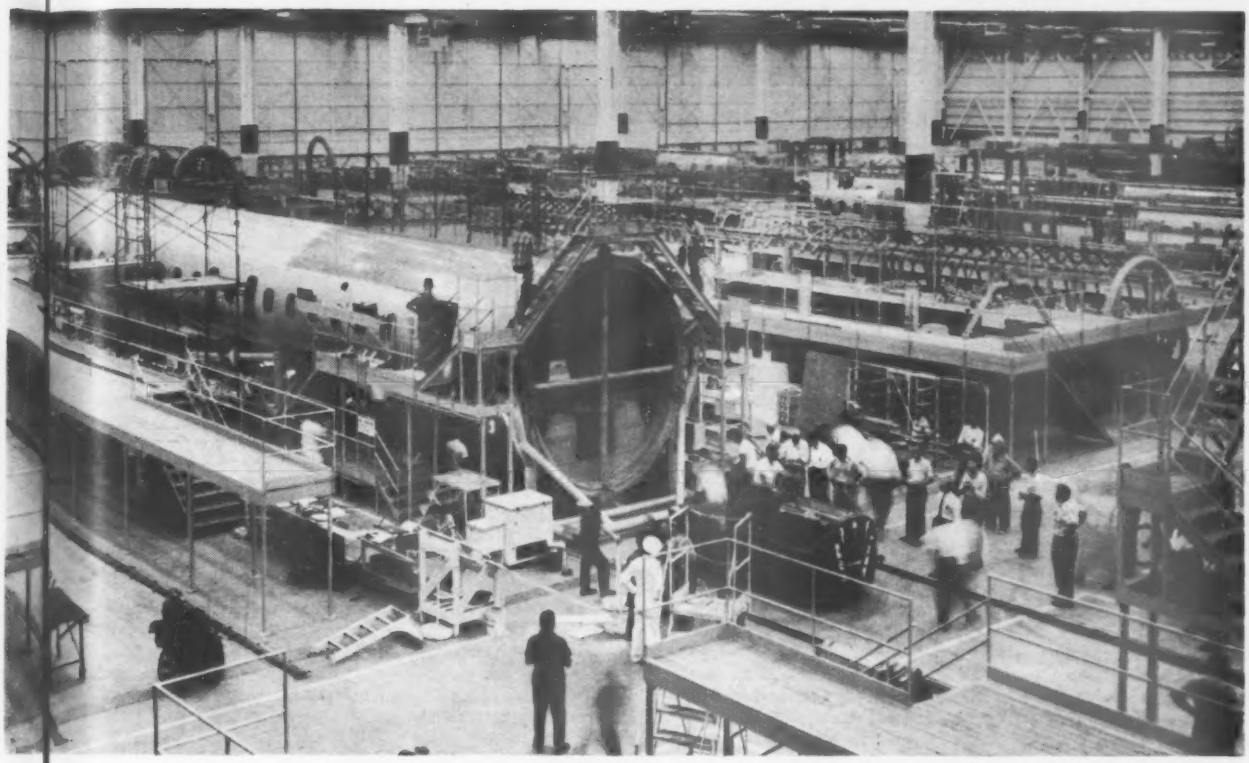




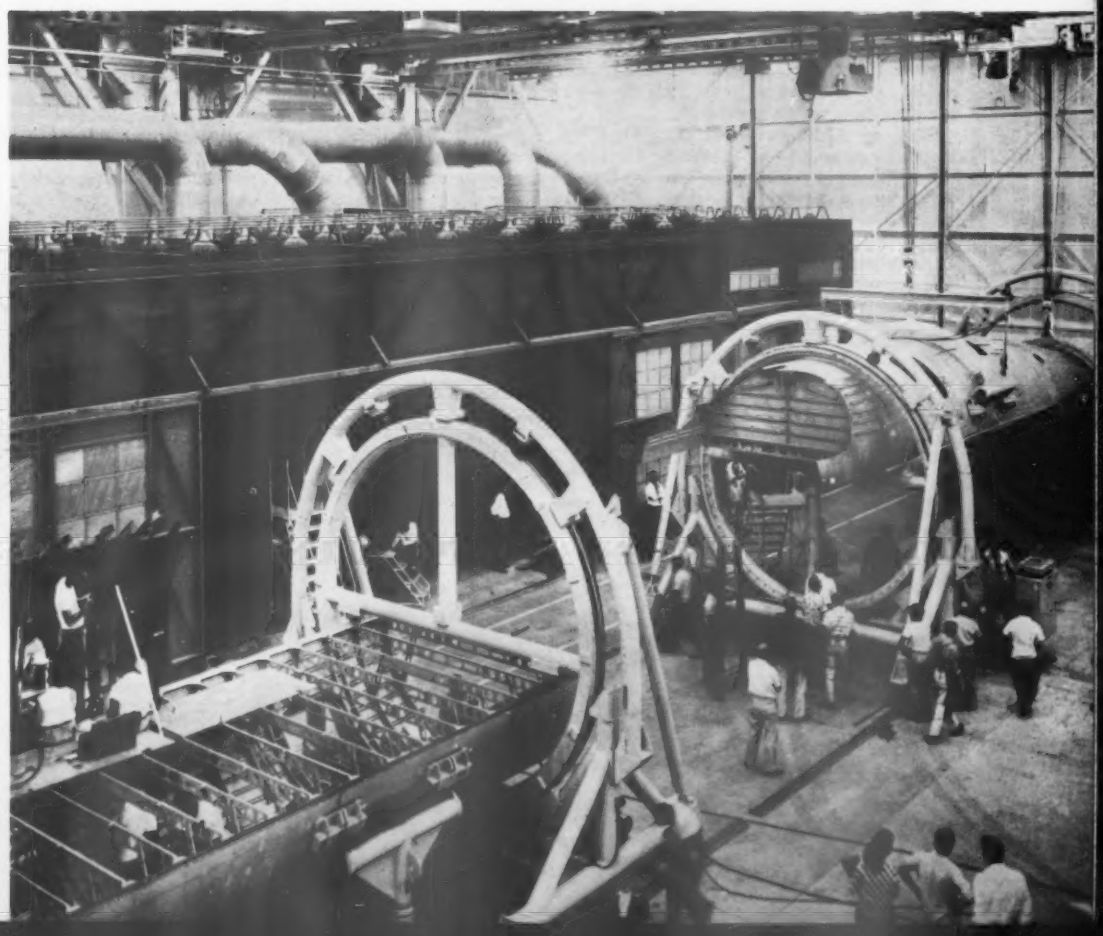
Reading in a clockwise direction round the page from the corner DC-8 production show: (1) the Sheridan four-way press, parts to curvature to the wing panels; (2) upper and lower fuselage fuselage sections being turned after assembly upside-down for the addition of trailing edges and flap fittings; and (5) three working levels, in which two sets of wings can be

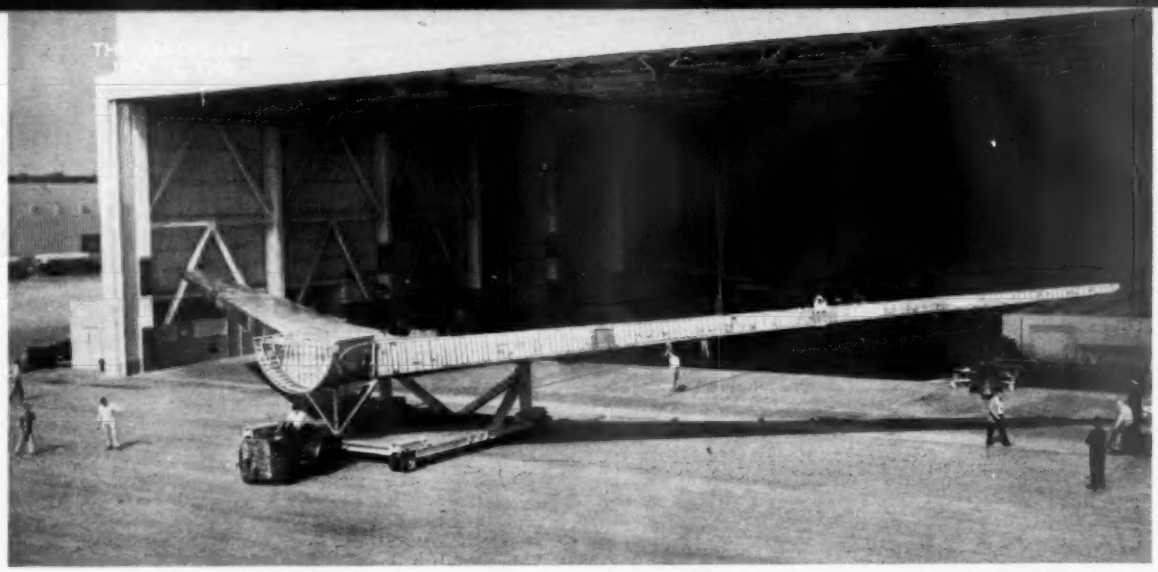
The Douglas DC-8 in Production

A Special Photographic Feature



ge from the ner, these pictures of r-way press, rts the aerofoil section lower fuselage joined ; (3) lower upside-down s in the assembly jig ngs ; and (5) ng wing tank jig, with wings can be d simultaneously.





The wing halves are brought together and joined in the structures assembly shed. The united wing is then taken in one piece to the tank sealing booth before going to final assembly. The special transporting dolly developed by Douglas to move this 27,000 lb. structure is seen in use above.

(*Continued from page 79*)

lower fuselage sections are put together in an upside-down position for ease of assembly. They are lifted next to turning rings which bring them into normal position for joining the lower sections to the top half of the passenger cabin. The turning rings have only one control and synchronized motors execute a smooth turning operation. Floor installations are completed while the sections remain in the rings.

While this work is in progress, the 18 panels of the upper fuselage are riveted to the 20-in. constant frame stations. After the lower sections are moved into position on the fuselage joining line, the upper half is lifted from its assembly jig and lowered into joining position. Clamps hold the skin and frames together so that the rivets can be inserted between them. In this fashion, the close tolerance holes can be held securely together. This completes the fuselage joining operation.

The nose of the DC-8 is made in three assembly jigs, for cockpit enclosure and lower and upper sections. After the sections are joined, the complete assembly is bolted to a pressure plate for a leak check, at 2 p.s.i. When additional installations have been completed, the nose moves down the line for joining to the fuselage.

The completed fuselage, weighing 19,000 lb., is the first component to move to final assembly for joining with the wing. Two dollies were designed and built by Douglas for the transfer, to prevent strains on the fuselage.

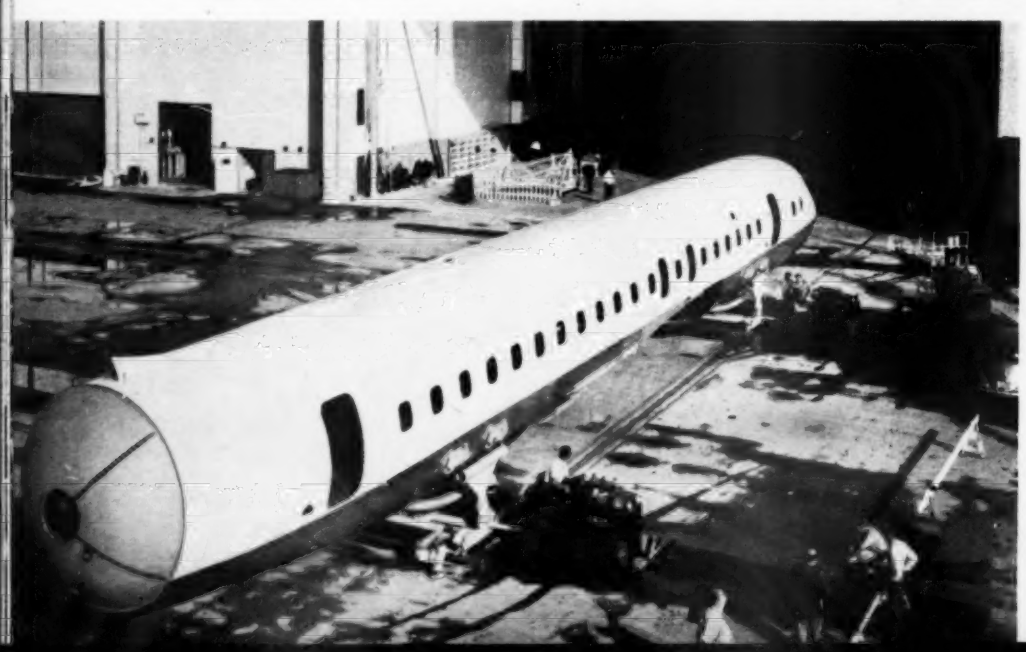
In the final assembly building, two slings lift the fuselage over the joining area. This permits the wing, 27,000 lb. in weight, to roll underneath into position.

While the fuselage is being moved, the wing is placed on a dolly to carry it out of the structures assembly building to the wing tank sealing booth. This dolly is equipped with combination casters and wheels which are easily changed, thereby eliminating the danger from lifting the wing from one dolly to another. Complete flexibility during movement is achieved, eliminating tracks which would be obstructions to traffic.

A special tilting platform has been developed for use in the sealing booth; this is operated by two massive hydraulic cylinders each 14 inches in diameter, with a 7-ft. stroke. One control console operates the entire system. Sealant is pumped in and out of the wing with a 25 horse-power air-driven hydraulic pump. Engineering requirements called for a tilt of 10 degrees, but the platform was designed for a growth factor of 20 per cent.

Two tanks on each side are filled for the first run, and this is repeated for the second run to fill the other tanks. Following tilting, the synthetic rubber compound is pumped out, leaving a film approximately a mil and a half thick as a hard coating on all interior surfaces.

The wing then moves to the final assembly building, where it is joined with the fuselage. Installation of the tail stub, landing gear assemblies, engine pylon structures, the four power plants, leading and trailing edges, control surfaces, flaps, flight deck controls and interior furnishings follow, and are completed prior to roll-out. The final assembly building comprises two bays, with the aircraft moving up one bay and down the other to emerge completed at the end they enter. The 180° turn from one line to the next is made outside the building at the far end.



The first completed DC-8 fuselage is moved into the final assembly shed. It has been rolled sideways from the structures assembly building (left of picture) on two special dollies running on tracks.

Guidance and Control for a Homing Missile

DURING the course of the inaugural lecture for the Royal Aeronautical Society's new Guided Flight Section (given in November last year by Mr. J. E. Serby, C.B., C.B.E., B.A., F.R.Ae.S., director general of guided weapons at the Ministry of Supply) and in the lengthy discussion period which followed, it was made quite clear that the design and development of any form of modern guided weapon was very much a co-operative effort. In point of fact, it embraces many diverse engineering sciences and involves mechanical, electronic, chemical and hydraulic engineers. And, because the object of their work, the guided weapon, has to be a compact whole, each part of which depends upon many others, each of these engineers has not only to become familiar with the arts of his colleagues but to understand the objectives and limitations of their various skills.

It is probably true to say that this emphasis on teamwork is nowhere more marked than in a project which is directed towards an understanding of how guided missiles systems can be analysed and improved to obtain greater accuracy and reliability. A research project of this kind has been carried out by Elliott Brothers (London), Ltd., and this work provides an excellent example of co-operative effort on a wider scale that has done much to advance British guided weapon technology. In this article we give a brief account of this contribution by the Elliott team.

Problems and ideas investigated theoretically and on Elliott-built analogue computers (Fig. 1) have been tried out in flight using a general purpose vehicle (GPV)—comprising a fixed-wing ground-to-air missile with liquid sustainer-rocket engine—for which the airframe, propulsion and control elements were provided by Short Brothers and Harland of Belfast. Shorts also collaborated in the firing of these rounds and in the analysis of their performance. The mass of information obtained as a result of the simulator work and flight trials has been disseminated to the Government Departments concerned, for the benefit of the guided weapons industry as a whole.

The guidance and control system of the GPV, designed and built by Elliotts, was studied in great detail, and its performance in all important respects became as predictable as that of a precision instrument, despite the high levels of vibration and acceleration under which it was required to perform without fault in the air. At the S.B.A.C. Show at Farnborough in September, 1957, the missile (Fig. 3) with its guidance and control system was on display to the public; its homing head could be seen detecting the evasive action of a dummy target and its fins moved in such a manner as would have kept it, in real flight, close to a collision course with the target.

For the GPV, a semi-active homing system was used. A ground-based radar transmitter, or "lamp set," radiated short pulses of energy at a wavelength of a few centimetres and these pulses, after reflection from the target, were the source from which the missile's guidance system derived its intelligence about the target's position and motion.

The homing head consisted of a microwave radar aerial system and a conventional radar receiver which, after stages of demodulation and smoothing, provided an output to precess

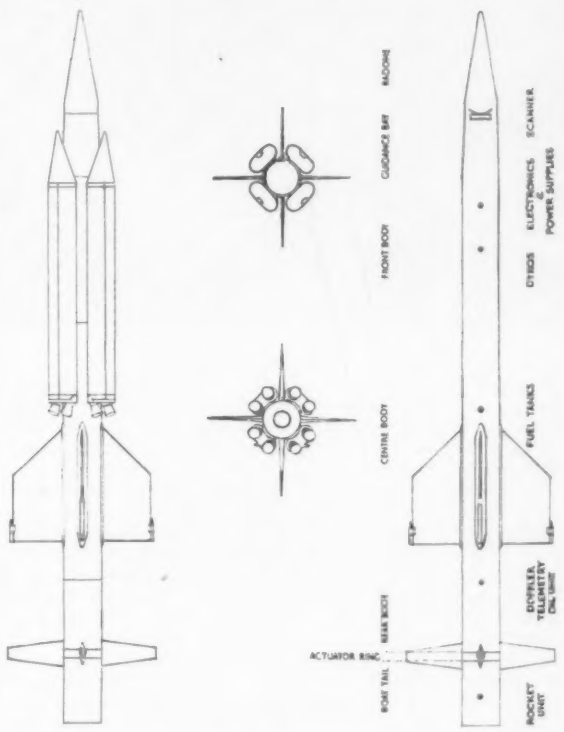
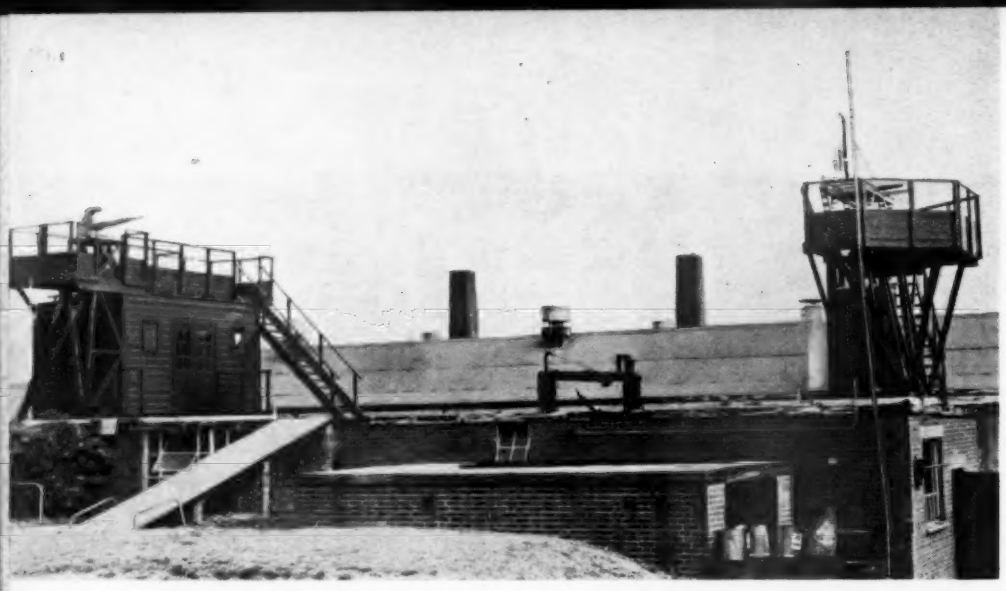


Fig. 2.—Short's General Purpose Test Vehicle for which Elliott Brothers (London), Limited, developed the guidance system and homing head.

Fig. 1.—With the aid of these analogue computers at Borehamwood, guidance and control problems were simulated prior to the firing of actual test rounds. Simulators of this sort can provide a great deal of information in a comparatively short space of time—and in many cases are used to solve flight problems without the need to fire a round.



At Borehamwood, Elliott's have this set-up for radome research and development. The test radome can be seen on the top of the building on the left; the "target" is on the tower on the right.

a free gyroscope in the direction in which the line-of-sight to the target was moving, at the same rate. A follow-up servo mechanism, using hydraulic fluid at high pressure to give the motive force, responded to signals derived from AC pick-offs on the gyro, in such a way that the radar aerial remained pointing in the same direction as the gyro, and thus towards the target. This scanner used a pair of specially designed adjustable-lap hydraulic control valves (Elliott type B603) which, operating at supply pressures up to 3,000 p.s.i., have a linear flow/displacement curve and can be adjusted readily to have zero lap.

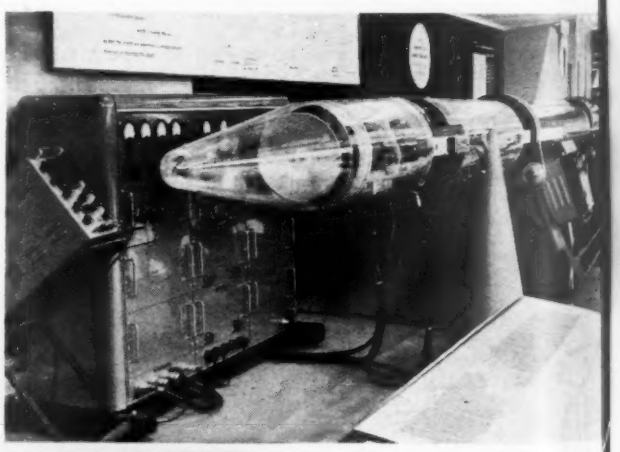
Figure 4 is a view of the whole homing head standing upon its tripod. The aerial system at the top is driven by push-rods from hydraulic actuators controlled by the torque motor and valve assemblies, one of which is visible on the other side of the main scanner casting. This conceals the gyroscope which is mounted axially in a set of gimbals linked to the microwave dish-aerial by the parallel linkage on the right. In the central compartment can be seen the local oscillator klystron and the waveguide assembly used in the radar receiver. The remainder of the electronic units associated with the receiver and the scanner servo-mechanism are contained in the compartment below.

One design of such units made the greatest possible use of " potted circuits "—that is, the embedding in resin assemblies of components liable to flap about under vibration and sudden acceleration. This technique had the disadvantage of adding to the weight of the equipment, and a more recent version of the homing head had its electronic units laid out on plug-in printed circuit plates, similar to that illustrated in Fig. 5. At the same time improvements were made to the mechanical design of the scanner to minimize backlash in the gyro linkage and " stiction " in the gimbals, and to facilitate the insertion of shaping networks in the position servo-mechanism causing the dish to follow the gyro motion.

Under transient conditions and late in flight, when the missile was close to the target, the motions of the line-of-sight from missile to target were often very rapid and in order to prevent the target echo falling outside the very narrow beam of the aerial, the dish had to follow the line-of-sight very accurately and quickly. This needed a high-performance broad-band servo capable of large rates of motion; such a servo was achieved in the space available by using a hydraulic, rather than an electrical or pneumatic, source of power.

The GPV homing head, of course, had to " look out " from the missile through a nose section transparent to electromagnetic radiation, and this nosepiece or radome had also to withstand the brunt of the drag loading and temperature rise during manœuvring flight. Thus it had to be both robust and thermally stable as well as electrically suitable.

Radome design has become a separate and skilled branch of missile engineering, since the combination of electrical and mechanical requirements is extremely difficult to meet with any single material. The most severe problem of all, perhaps, is that a radome having a shape fixed by aerodynamic requirements inevitably distorts the electro-magnetic wave arriving from the target—in a manner very similar to the refraction of light. The homing head, therefore, does not " look " directly at the target but in some slightly different direction. This has



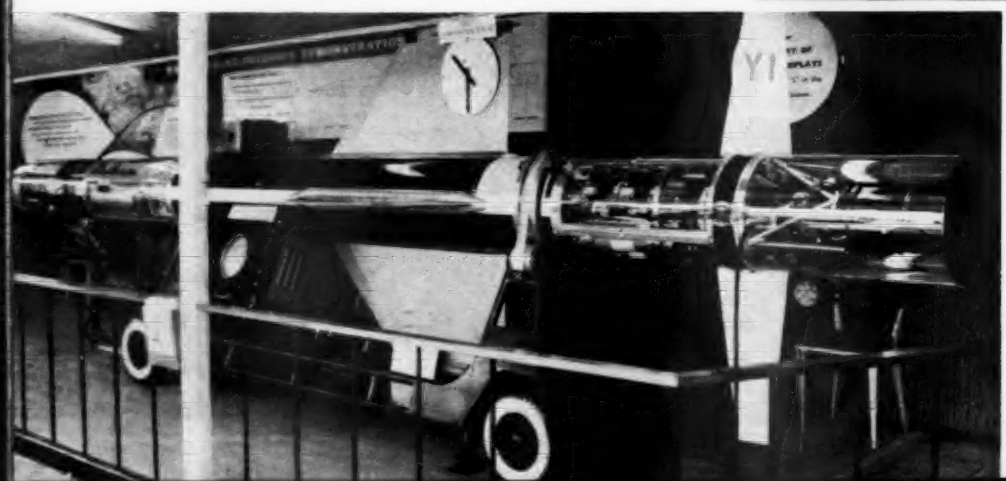


Fig. 3.—Above, the Short GPV as shown at the 1957 S.B.A.C. Display at Farnborough with its Elliott homing head and guidance system visible in Perspex sections. Left, another view taken at Farnborough shows the control end of the vehicle.

immense repercussions on the accuracy of the missile's homing and it has become necessary in designing radomes to insist on accuracies in moulding and machining of a thousandth of an inch over the whole of the surface.

Naturally, if a radome made of anything but the hardest of materials has to be flown through rain, it will suffer badly from erosion and its electrical properties may be lost. This is an additional serious restriction on the range of materials that can be used. In parallel with the design and use of the guidance equipment, Elliotts have been continuously at work on this problem.

In the GPV, the information about target motion obtained by the homing head was resolved from axes fixed in the aerial to axes fixed in the missile, processed to achieve a prescribed navigation law, and then fed to the four fin servos of the missile. These, too, were hydraulically actuated to minimize the servo lag and were capable, in conjunction with a simple autopilot, of controlling the lateral motion of the missile to

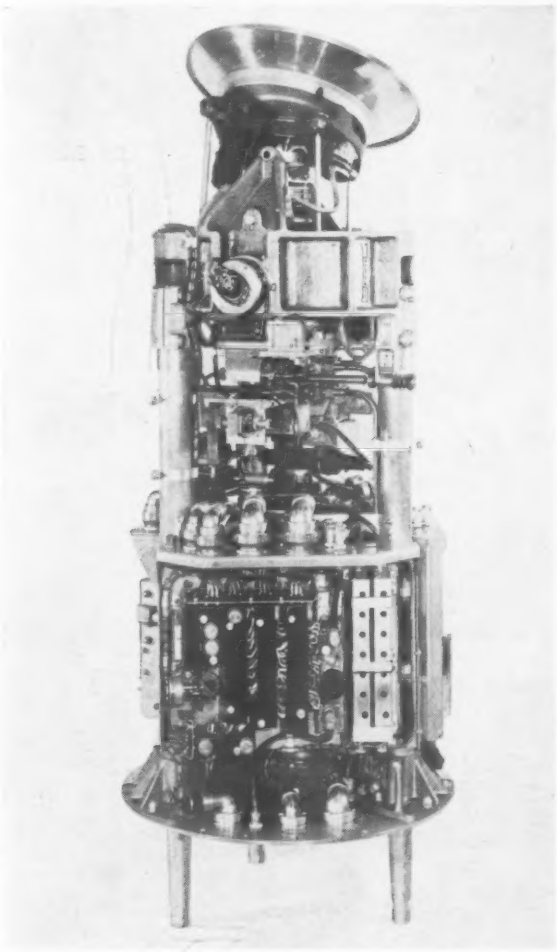
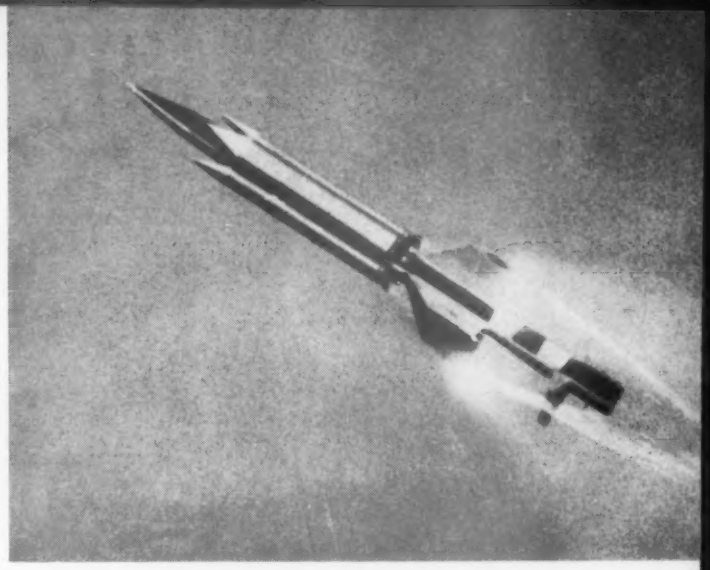


Fig. 4.—The complete Elliott homing head unit and scanner for the Short GPV.

achieve the rates of turn demanded by the navigation system. This they did by working in pairs, one pair for pitch and the other for yaw. In addition they operated differentially to control the motion of the missile in roll. During guided flight, the fins, together with a non-linear roll control system developed as a result of extensive computer work, were able to stabilize the roll motion to within a fraction of a degree of a prescribed datum.

The complete homing heads, together with control units, were developed and manufactured by the Elliott Guided Weapons Division at Borehamwood in Hertfordshire. Rounds received from Short Brothers were prepared at Elliott's Trials Assembly Base at Rochester, for delivery to the firing range. Here



The test vehicle in flight soon after launching; note the flares on the wing tips for tracking purposes.

the homing head was assembled into the round, while the whole control system was tested and calibrated in conjunction with a roll simulator to ensure its proper operation in flight and to facilitate the interpretation of results obtained from the missile's telemetry transmissions during the trial.

The setting-up of the homing head and checks on the performance of its radar receiver and scanner servo were accomplished using the guidance pre-launch test gear illustrated in Fig. 6. This equipment was specially designed to enable the scanner to be operated as a local position servo before being made subject to the demands coming out of the radar part of the angular tracking system. Finally, the head was locked on to a klystron-fed point source in the laboratory both in range and angle, using synchronizing signals generated from the test equipment. Moving the point source in a known manner provided a test input to the system rather more severe than the motion to be expected on a real target. From this it could be determined that the head would perform properly during its subsequent flight.

A duplicate set of the guidance pre-launch test gear was used to check the system at the trials range, and in the actual firing of the missile the guidance equipment was monitored during the complete firing sequence from a special guidance controller's console.

Throughout the development stages of this work, and particularly in studying the equipment as part of a complete homing

Fig. 5.—A more recent development in the homing head has been the introduction of plug-in printed circuit plates such as this.

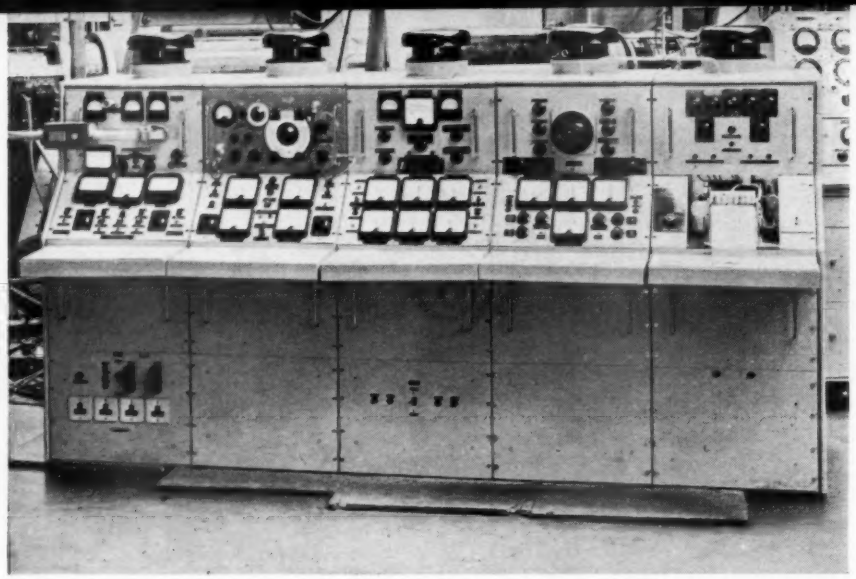
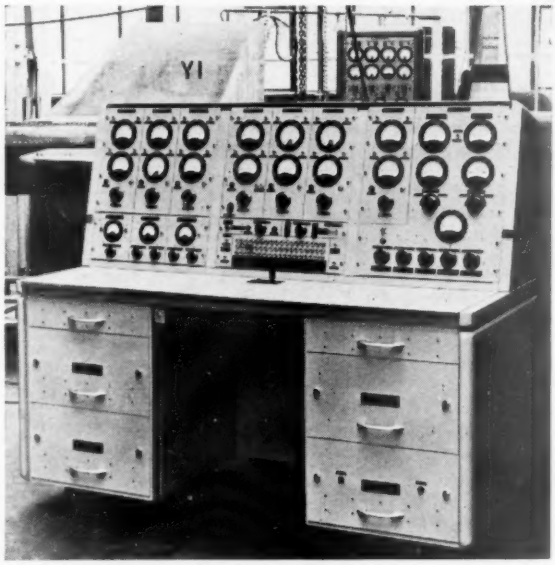


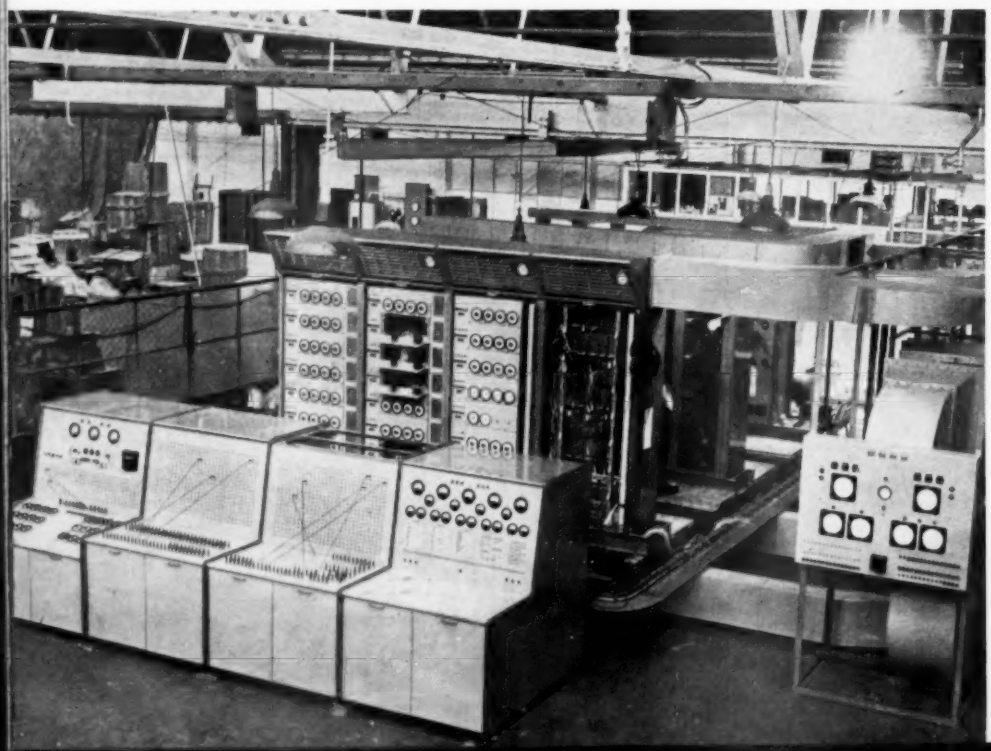
Fig. 6.—This pre-launch guidance test gear has been developed by Elliotts for setting up the homing head and checking the radar receiver and scanner servo prior to flight test.

system, extensive use was made of the homing simulators illustrated in Fig. 1. With the exception of two cabinets housing diode non-linear units, servo-multipliers and display units, these simulators comprise cabinets of Elliott G-PAC analogue equipment.

Problems requiring up to 120 computing amplifiers and their associated networks can be solved, and units of the missile guidance and control system could, when desirable, be used in conjunction with simulated representations of remaining parts of the homing loop such as the kinematic equations and the aerodynamics of the airframe. Miss-distances were displayed visually on a calibrated cathode-ray tube screen and other quantities could be monitored on chart recorders. When numerical computation of high accuracy was required, the full range of Elliott scientific digital computers was available for the purpose.

With the initial development of this basic guidance and control system successfully completed, it becomes possible to embark on a whole range of research programmes to investigate various problems and the effects of individual parameters. No details of this current or future work in this direction are available, but it would seem at any rate that the Elliott guided weapons team are hard at work in close collaboration with Shorts. It will be interesting to see whether, in course of time, an operational-type missile is produced at Belfast and guided and controlled by equipment from Borehamwood.



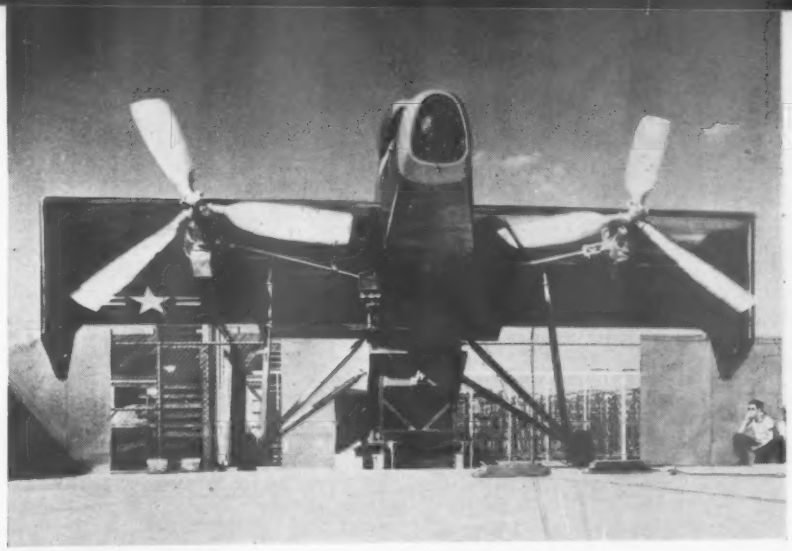


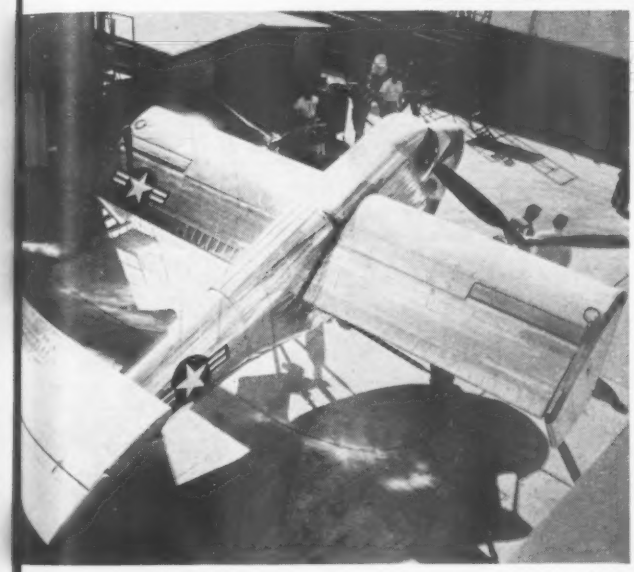
Above, the pre-launch test console for checking the vehicle's control system before firing. As in the case of the guidance test equipment this apparatus has been developed entirely by Elliott Brothers.

Left, this analogue computer was supplied by Elliotts for the Australian guided weapons research programme.

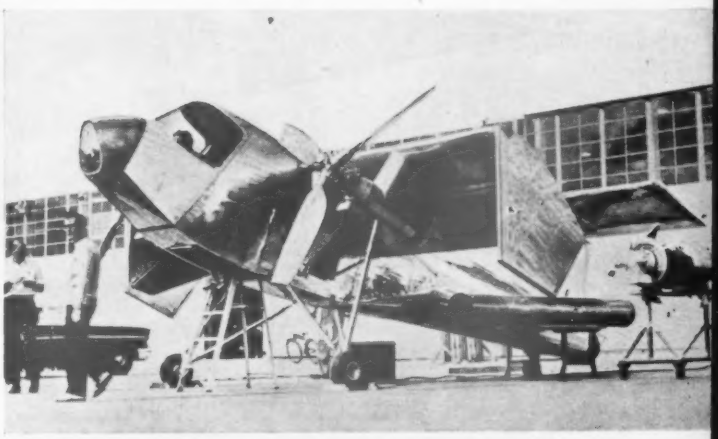
Flat-riser by Ryan

Howard Levy photographs





Forward and downward view from the Ryan Vertiplane is via a window in the fuselage nose, as shown above. Note the propeller drive-shafts from the fuselage. Left, since full-span wing flaps are used, lateral control is by spoiler-type ailerons ahead of the flaps. Air is drawn in through the perforated fuselage skin by a single Lycoming T53 shaft turbine of 1,000 s.h.p.



A tailwheel undercarriage is necessary for this deflected-slipstream flat-riser because the angle of deflection is only about 70 degrees. Below, the extent of the flaps requires a large angular range of tailplane incidence to compensate for nose-down pitching moment in hovering flight. The gimbal-mounted exhaust outlet gives directional control at low forward speeds.

Helping the Helicopter

VARIOUS MEANS of giving temporary extra-power to helicopters were considered in the paper "Boost Systems for Helicopter Gas Turbines," given by Dr. A. W. Morley, Ph.D., A.F.R.Ae.S., to the Helicopter Association of Great Britain on January 10.

It is well known, said the lecturer, that the single-engined helicopter requires a much bigger engine for take-off than is necessary for cruising flight. In most cases a considerably greater payload might be carried if the engine power could be increased temporarily for take-off. Again, in the twin-engined helicopter, which is required to fly safely on one engine, unless the engines are oversize for take-off, more power is required to fly comfortably with one engine out of action than the remaining engine can stand. In the great majority of cases extra power is required for a minute or two only; for example, to clear local high ground; to enable a manœuvre from hovering flight into a comfortable cruising condition; or to make a safe take-off or landing.

For such purposes it becomes important to develop ways of boosting the engine power for short periods. If this can be done successfully the operator will then be able to accept bigger loads, guarantee satisfactory performance with one engine failed, and not be affected by the loss of engine power which occurs on a hot day. Again, from the designer's point of view, use of emergency boost will permit a reduction in the size of the powerplant and thus offers major gains for no alteration in normal performance.

Alternative Solutions

There are four methods of augmenting power which seem worthy of present interest. They are:—

(a) The rocket-on-rotor system which uses small rocket units at the rotor blade tips;

(b) where there is provision for a gas-drive to the rotor tips, the boosting obtained by burning more fuel before the tip jet nozzles;

(c) where the rotor is mechanically driven, the power can be boosted by increasing the output of the main turbine for a short period;

(d) where an auxiliary gas turbine is brought into operation to meet conditions otherwise too severe for the main powerplant.

Of these four, the first is already used on piston-engined helicopters and its application to the turbine-driven machine will follow the established technique. The others concern the gas-turbine helicopter.

A method of using a "cold" hydrogen-peroxide rocket to augment rotor h.p. has been developed by the Reaction Motors Corporation in the United States and by Napier in this country. The Napier system has been used successfully in the Saunders-Roe Skeeter Mk. 5 and Mk. 6 and is also projected for use with the Skeeter Mk. 12 and the Westland Whirlwind.

Looking further ahead, some alternative liquids have been suggested in place of peroxide for rocket-on-rotor use. Thus, a mixture of ethyl nitrate and propyl nitrate gives a theoretical specific impulse up to 50% greater than the peroxide. This combination has been used with some success in mono-propellent rockets. At present, however, ignition is a problem and, further, the combustion chamber size would be considerably greater than that for the simple decomposition of the peroxide.

Rotor power-boosting by afterburning at the rotor-blade tips can be applied to four possible types of tip-jet propulsive unit. These are: the tip-mounted turbojet, the ramjet, the pulse-jet and the air or gas pressure-jet.

When the tip-mounted turbojet arrives, boosting by reheat will be straightforward. The ramjet has already been used successfully for the main propulsion of small helicopters but depends entirely on the intake ram obtained by rotation of the rotor. Since the rotor is limited to subsonic speeds the amount of available ram is too small for efficient working. Moreover, the thrust is influenced by the angle of attack of the rotor and is therefore liable to suffer unwanted variations as the pilot alters the rotor-pitch controls.

Pulse-jets have also been used successfully for small helicopters and so should be considered when reviewing the whole field of possible boost motors. Here the thrust characteristic is such that the available power is reduced to practically zero when the high tip speeds are reached—which, unfortunately, is opposite to ideal requirements.

One comes, finally, to the pressure-jet which has more possibilities as a boost system. Here combustion chambers at the blade tips are supplied with compressed combustible gas from an engine mounted in the aircraft. In one form, an air bleed is taken from the engine compressor and in another, air is supplied from an auxiliary compressor clutched in when the pressure-jet is needed. The latter is used in the Fairey Rotodyne.

A potential advantage of boosting by tip-jet burning is that there is no sudden change in anti-torque reaction even if the boost is very rapidly applied, and no loss of effectiveness due to the need to supply power to an anti-torque propeller. Since the boost system is likely to be called on quickly in an emergency this absence of any further upset to the forces acting on the helicopter will be most desirable.

To avoid some of the complications connected with the overload of the mechanical rotor drive at the cost of introducing others perhaps not so serious, a combined system may be considered in which the normal power to the rotor is by mechanical drive while the boost power is by pressure-jet to the rotor tips. This composite scheme is good in one respect because the air pressure-jet is probably the best all-round system performancewise for hovering and short-endurance flight, which is the sort of operation in which an emergency system is most likely to be wanted while the direct drive is probably the best all round for cruising and extended flight. The composite system would burn engine-compressed air at the rotor tips in emergency and no more load would be imposed on the load turbine or rotor drive.

Finally, one should take a brief look at another scheme for boosting, which consists of an auxiliary gas turbine connected via a free-wheel to the main rotor drive in such a way that it augments the output from the main engines in an emergency. Thus in a twin-engined helicopter, coupled to the common transmission, there would be two identical main turbine units and one auxiliary-boost turbine unit. Unlike the ramjet or other tip-reaction motors considered above, one now has a boost unit of the same type as the main units with the same handling characteristics and good fuel economy.

Undesirable as will be the complication of a third engine, this solution can appear attractive to the designer when an engine of proved design and suitable size for an auxiliary already exists, and where the main units cannot be boosted sufficiently to permit the full use of the capabilities of the aircraft.

Conclusions

Dr. Morley concluded from his survey of the methods available that the best boost system must be based upon the degree of boost available, on the endurance required and the total weight for a given endurance. Reliability and flexibility must also be considered.

The rocket-on-rotor system probably has the greatest power potential and calls for the minimum of modifications to existing powerplants and airframes. The composite pressure-jet/mechanical-drive system using an auxiliary compressor clutched-in to the remaining "live" engine (of a twin-engined helicopter) has a high potential output without imposing any more load on the live engine.

Boosts of 40 to 50% take-off power should be available with the helicopter gas-turbine engine using a mechanical drive, by overspeeding combined with water injection.

The composite gas turbine and pressure-jet system is an interesting possibility. According to estimates its endurance time would be mid-way between the rocket-on-rotor and the straight, uprated mechanical-drive turbine. It would permit the power to the rotor to be increased without torque reaction and for no more load on the rotor mechanical drive. In cases where such advantages are not sought, the uprating of the main gas turbine appears preferable.

Coachmakers Entertain the Air Council

MEMBERS of the Air Council were guests of the Worshipful Company of Coachmakers and Coach Harness Makers in London at the Tallow Chandlers Hall on January 7. This was the first occasion they had been so entertained for seven years. Speeches at such dinners are for the company and not for the wider world outside the panelled walls of the hall. Consequently, a full report is not to be expected. It may certainly be said that they were in the mixed vein of wit and reminiscence proper to such occasions.

The Livery were delighted to take advantage of this the first opportunity of congratulating the Chief of the Air Staff on his promotion to Marshal of the Royal Air Force or, as Sir John Slessor put it, to becoming a member of "Our Five Star Trade Union."

In his speech, M.R.A.F. SIR DERMOT BOYLE was at pains to explain the constitutional difficulty in which he found himself since there had been no prior meeting of the Air Council for which he was spokesman. How could he say what he thought if the Air Council had not met to say what they thought that he should think that he ought to say or, as he put it: "How can I say what I think until I have heard the Air Council say what they think I ought to say that I think?" It was not long, however, before he was explaining that the heavy cuts in defence spending would still mean a very large expenditure. He emphasized the importance of expending every penny we could afford on research and development.

He amused his audience with a discourse, in reminiscent vein, concerning the disadvantages of thick elastic rope as a towing medium. His concluding story told of the Irishman, commenting to the chap who was referring to the Empire on which the sun never sets: "Shure," said Pat, "The Almighty could not trust you with it in the dark."

SIR FREDERICK HANDLEY PAGE had opened the toast list by proposing that of the Master, Mr. R. J. D. Smith, whom he described as the "Friend of Everybody." The toast of the Master had been drunk regularly ever since 1677 and this was in the time of Charles II who had so successfully striven to build up the wounds in the body politic. Sir Frederick then had a lot of fun with analogies between King Charles' activities and certain aspects of the aircraft industry. He went on to associate the names of the wardens with the toast.

MR. R. J. D. SMITH, the Master, who alleged that he was left wallowing in the slipstream left by Sir Frederick's oratorical flights, gave an extremely well-controlled (to continue the simile) speech. And, indeed, had fun with the Handley Page "Yellow Peril" of 1913 and the later (1915) "Bloody Paralyser." He got home a shrewd shot with a jest about Barking Creek. Among later disclosures was the fact that he and Sir John Slessor had both been at Haileybury.

M.R.A.F. SIR JOHN SLESSOR proposed "The Guests" and taking the Master's allusion to a well-known school as his text, as it were, was able to demonstrate how much the Air Council owed that institution. It became clear that members of the Air Council also shared certain common experiences in India. He recalled a wartime reminiscence of Prime Minister Churchill arriving "disguised as an Air Commodore" on a dreary wartime airfield in Greece to satisfy himself that we were not buying "a pig in a poke." He said, too, how fine it was to have as Air Minister one who had been both an Auxiliary and a regular officer in the Royal Air Force. It must, indeed, have been a trial for Mr. George Ward, with his long association with "White's Own" (No. 601) Squadron, to have presided during the period of the Auxiliaries' dissolution.

SIR REGINALD VERDON SMITH was able to suggest that there were other schools besides that mentioned and went on to make the two joining members welcome. One of these, Mr. M. A. H. Christie, replied gracefully and briefly, ending with a nice story to show that scientific conclusions may be based on false premises.

A Busy Life

MANY friends in the aircraft industry will be interested to know that Mr. Cedric Howarth, I.S.O., F.R.Ae.S., A.M.I.Mech.E., has just retired after 43 years in Government service. He returned from the Royal Air Force to the R.A.E. Farnborough in 1919—where he became engaged on full-scale experimental flying, including work on air-to-air and ground-to-air towed targets. In 1932 he was transferred to the Air Ministry H.Q.—where he had responsibility for naval aircraft, catapults, deck arresting gear, flotation gear and inflatable dinghies.

In August, 1939, he was seconded to the team formed to review the aircraft industry and plan increase of capacity for war effort. In 1939, too, he visited Australia and New Zealand as Technical Adviser to the United Kingdom Air Mission.

From 1940 until the end of hostilities he had charge of the department responsible for the production of undercarriage and hydraulic equipment for all types of aircraft.

In 1948 he transferred to the munitions side of M.o.S. as Asst. Director co-ordinating Development and Production of equipment for the Royal Engineers.

In 1937 he received the King George VI Coronation Medal and in the Birthday Honours 1956 was invested as a Companion of the Imperial Service Order.

An American Twin-Jet Triphibian

FOR the past three years the Air Craft Marine Engineering (ACME) Company of Van Nuys, California, has been developing an eight-seat twin-jet triphibious aircraft suitable for executive, transport and utility uses. A mock-up has been completed and the prototype Model A-1 is expected to fly next summer. An illustration appears on page 67.

The aircraft will be able to operate from land, water or snow through the use of a sponson/landing gear combination with shock-absorbing liquid springs. Drag-producing wing-tip floats are not required with these sponsons, and a retractable step fairing further reduces hull-drag losses. A complete boundary-layer system will provide STOL characteristics permitting the A-1 to be flown from unprepared fields at 45 m.p.h. besides cutting down water take-off runs. A retractable outboard motor, remotely started and steered, is located in the tail cone, and will enable the pilot to cut the jet engines after landing and taxi the aircraft through a harbour to a dock or mooring.

The first production Model A-1s will be powered by the Continental Model 420 Turbofan engines; with these powerplants the cruising speed will be 340 m.p.h. and the maximum speed 370 m.p.h. According to Robert M. Berns, ACME's chief engineer, the company is engaged on an engine improvement programme to increase the thrust and make possible a 420-m.p.h. cruising speed. Purchasers who take delivery of the aircraft with Model 420 engines will be able to have the newer engines installed as they become available. The powerplants are in a "capsule" design, which allows a complete engine change in 5 min. In cold weather these powerplants require no heating equipment; and fuels may be kerosene, gasoline or blends. With the Model 420 engines the full gross range will be about 1,150 miles and 1,600 miles with the new engines. The fuel capacity is 480 U.S. gal.

The ACME A-1 uses the "structural sled" method of construction, which the company feels provides the greatest possible protection in the event of a crash. Light magnesium-alloy and durable epoxy glass fibre are used to construct, as the company puts it, "the safest possible aircraft, capable of taking the roughest shock of landing in water or snow." The one-piece seamless glass-fibre honeycomb hull provides safety and ease of maintenance.

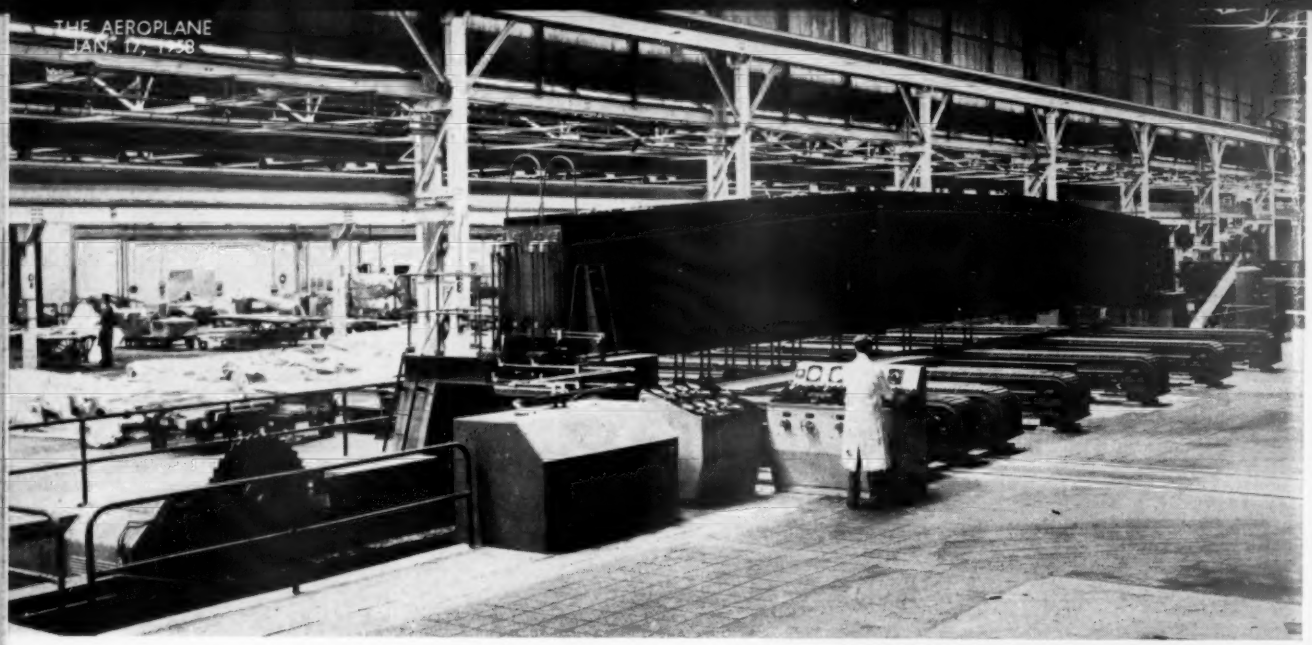
The cabin is pressurized and positioned high to provide good visibility for pilot and passengers. The pilot and one passenger sit forward, with two rows of three passengers behind. The baggage compartment is aft of the cabin and there is a nose area provided for weather-radar installation without design modification.

Target price is $125,000 for the aircraft based on a production rate of 50 a year. The ACME A-1 is designed to meet C.A.R. requirements 04b, permitting it to be used for scheduled commercial operations.—HOWARD LEVY.

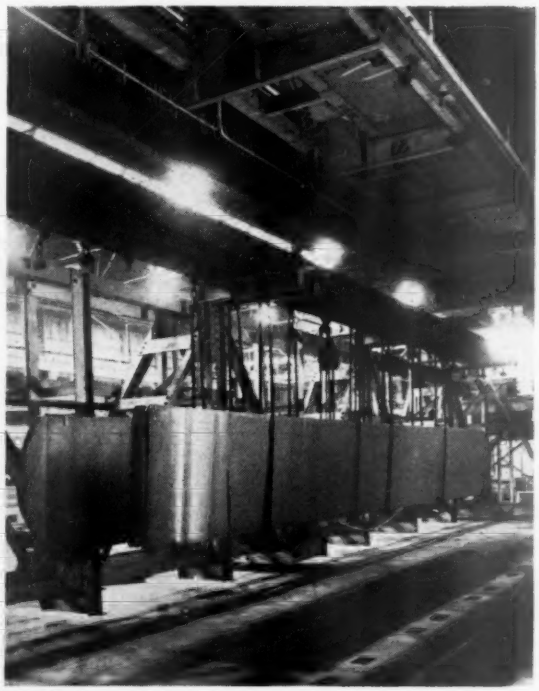
Design Data

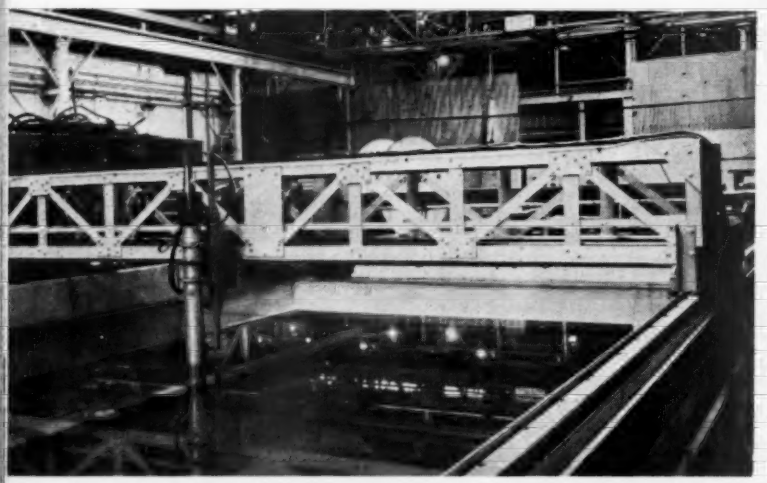
DIMENSIONS.—Wing span, 46 ft.; length, 38 ft.; height, 11 ft. 6 in.; cabin length, 120 in.; cabin height, 59 in.; baggage volume, 80 cu. ft.; wheelbase, 13 ft.; wheel tread, 12 ft.

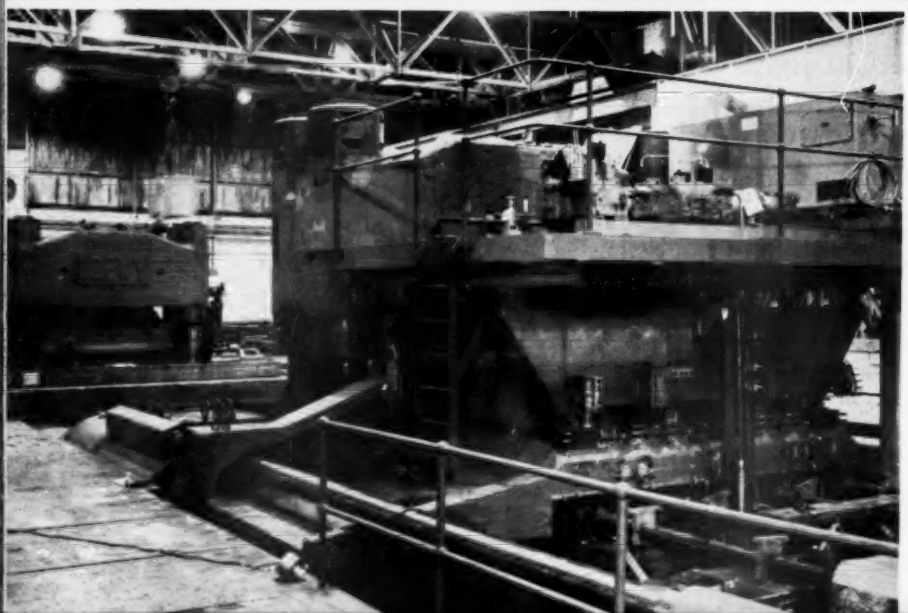
WEIGHTS.—Gross, 8,900 lb.; payload, 2,220 lb.



Noral Stretched-plate Facilities at Rogerstone







Much interest is being taken by British production engineers in the high-speed milling of very large stretched light-alloy plates. To provide such material new equipment has been installed by the Northern Aluminium Company. Top, the high-speed plate saw. Above left, ultrasonic flaw-detecting equipment in which the plate is scanned by the travelling head while immersed in the water tank. Above, hoisting a load into the heat-treatment furnace. The quench tank is below the furnace. Left, a general view of the 4,000-ton stretching press, the jaws of which can take plates up to 10 ft. wide or up to 6 in. thick.

NEWS OF INDUSTRY

Goodyear Skid Warning

A PRACTICAL demonstration of the aircraft skid-warning system developed by the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., was arranged for representatives of the aircraft industry and airline operators by the company's aviation division at Wallasey last week. Attended by some 60 visitors, including a number from overseas companies, the conference was the first of its kind the Goodyear organization has held in Europe, and consisted of a lecture session followed by the actual testing of the equipment.

The problem of eliminating the possible locking of the main undercarriage wheels of an aircraft during the landing run is well known, and to overcome this condition a number of complete anti-skid systems have been introduced during the past few years. The anti-skid system produced by the Goodyear aviation division is now in service on a number of military and civil types, and the new skid-warning system is not intended to supersede the previous equipment.

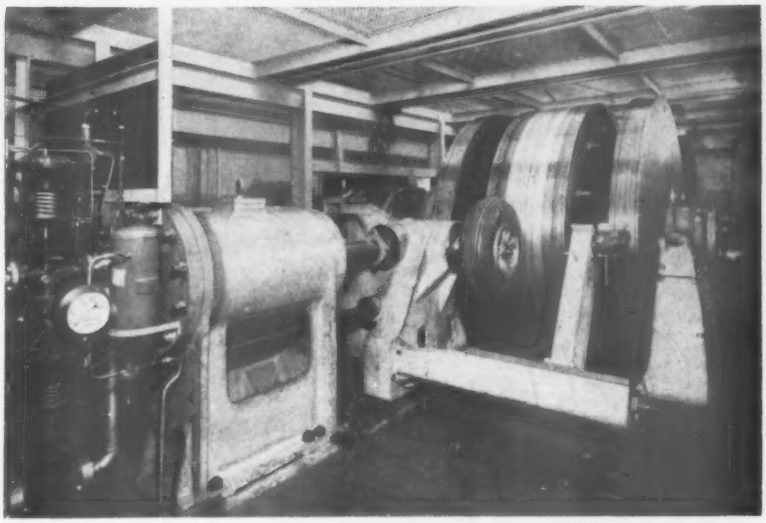
Designed to provide skid protection with a minimum of modification and approval complications, the warning system consists of a detector unit mounted within each mainwheel axle, a skid indicator attached to each brake pedal on the pilot's rudder bar, and the necessary electrical wiring to connect the units with the normal 24-v. DC aircraft power supply.

This simplified design does not require any connection or modification to the brake system, and is particularly suitable for adaption to existing types as well as new aircraft.

The actual warning signal, to the pilot, of overbraking is in the form of a vibration or "thump" to the sole of his shoe by the skid indicator, which stops operating as soon as the incipient skid conditions are eliminated by the necessary reduction of the braking force. This method of providing anti-skid protection leaves the pilot in complete control of the brakes and the manufacturers state that with correct operation it can produce shorter stopping distances than the complete anti-skid system.

Although no British aircraft has yet been fitted with the system, flight tests have been made by Goodyear on a Panagra DC-6B and results show that adequate skid-warning information is provided. The average time that a wheel remained locked in a skid after warning had been passed to the pilot was 0.3 sec.

Used for the skid-warning tests is this dummy pilot's position incorporating a speedometer, brake pressure gauge and stopping-distance recorder.



The 120-in. diameter dynamometer at the Wallasey works of the Goodyear aviation division. The flywheel has a maximum mass of 45 tons and is used for testing various types of aircraft wheels and brakes.

The detector unit is contained in a cylinder which, as already stated, is mounted within the mainwheel axle. The interior of the cylinder is divided into two sections, one containing the mechanical actuating and detecting mechanism and the other housing a miniature cam-operated switch. A drive dog which is part of the hub cap provides a positive drive to the detector unit, and upon a sudden deceleration of the aircraft wheel the switch closes and directly energizes the skid indicator.

Controlled by the drive dog, the detecting mechanism is in the form of a DC generator and produces a voltage which is proportional to the rotation speed of the wheel. This generator is connected to a capacitor/relay circuit, and at a constant wheel speed it provides a steady voltage. If the wheel speed changes rapidly, however, the generator voltages change at the same rate, and at a predetermined current the relay controlling the skid indicator circuit is operated.

Mounted on the underside of the brake pedal the skid indicator consists of a small DC motor-driven assembly. On being energized the motor vibrates a small spring-mounted plunger that extends through a hole in the brake pedal. It does not vibrate the pedal itself or affect the applied pressure.

For the purposes of the demonstration a 120-in. diameter dynamometer in the laboratories at Wallasey was used to simulate a landing run of a mainwheel assembly, which was controlled from a dummy pilot's seat incorporating a rudder bar and foot brakes. To assist in the tests the ram load on the wheel was reduced to 3,000 lb., and with the rubber deposit already on the dynamometer, the coefficient of friction between the tyre and the "runway" was approximately equal to wet-ice conditions.

This meant that the wheel locked very easily and the foot pressure on the brake pedals had to be completely released before the wheel started to rotate again.

Wind Tunnel Control

DETAILS of the comprehensive transducer system which maintains an automatic safety check on the strain in the material forming the throat of the new 8-ft. supersonic wind-tunnel at the Royal Aircraft Establishment, Bedford, have been given by the suppliers of the equipment, Salford Electrical Instruments, Ltd. This tunnel, which was formally brought into service in June of last year, was described in THE AEROPLANE of July 5, 1957.

Consisting of two 1-in. thick stainless-steel plates, each 62ft. long by 8 ft. wide, the throat is used to control the wind speed in the tunnel. This speed control is achieved by flexing each plate by means of 120 mechanical jacks spaced in pairs at approximately equal distances down its length, and so changing its shape.

The transducer system provides a continuous record of the radius of curvature of the throat plates at each jacking position during operation and, therefore, the strain on the plate at this point. It consists of 60 spherometer-type transducers, one being mounted between each pair of jacks, and a comprehensive control unit which indicates the transducer displacements on a display panel.

Designed for measuring small changes in radii of curvature, the S.E.I. spherometer transducer has a sensitivity that can be as high as .0025 in. Its head is an electromagnetic mechanical-displacement type transducer, and a central stylus controls the position of a magnetic armature disc which is mounted in a gap between two pairs of coils. Each pair of coils is wound as a transformer.

A constant alternating current is fed into the primary winding of each transformer and the output of the secondary winds is connected to the moving coil of a special dynamometer-recording instrument. Any movement of the armature disc brought about by a change in curvature causes a corresponding change in the inductance of the moving coils, with a resultant increase or decrease in the current to the indicating unit.

Private Flying and Gliding

Reproduced below is a poster issued by the Flight Safety Foundation, Inc., of New York, the message of which might well be taken to heart by pilots in this country. The picture on the right shows aircraft types in production by the Cessna Aircraft Co., of Wichita, Kansas. From top to bottom they are the Model 310B, the new Skylane, the Model 182 and the Model 172.

WINTER WARNING!
On snow or icy runways
Brakes make skates of wheels!
For safety in winter operations, make short-field landings and taxi slowly

GLIDING NOTES

TICKETS for the British Gliding Association's Annual Ball on Friday, March 14, can now be obtained for £1 each, which includes supper. The Ball starts at 20.30 hrs. and ends at 02.00 next morning; then, after a 7¼-hr. interval, the Instructor's Conference begins. The club secretaries, managers and treasurers get an extra half-hour's sleep, for their conference, the first ever held, begins at 10.15. The annual general meeting is at 14.30 on March 15.

For the National Soaring Week, which takes the place of a National Championship meeting this year, six clubs have already expressed their hope of running localized competitions: they are the Bristol, Derbyshire and Lancashire, Kent, London and Yorkshire Clubs, and the Scottish Gliding Union. The period is from July 26 to August 4.

* * *

BRISTOL GLIDING CLUB expects to have about 20 sailplanes flying from Nympsfield during National Soaring Week; this number includes visitors.

Peter Collier, the club's resident instructor-manager, has left for a two-months' visit to West Africa, where at one time he represented the Housing Division of the Bristol Aeroplane Company; he will be back in time to run the instruction courses. Many British gliding clubs will be running such courses, which are open to non-members; but no dates have yet been announced.

A standing wave appeared in a north-westerly wind on the last Sunday of the year, December 29, over Frocester, a mile upwind from the Bristol club's Nympsfield ridge; it lifted Keith Aldridge in the club Skylark 2 to 5,500 ft. above take-off, or 6,240 ft. a.s.l. This was well above the top of an inversion at around 3,500 ft., but just at the bottom of a shallow laver in which the wind speed fell off with increasing height, to judge by interpolation between upper air data from Cornwall and Sussex. In the same wave John Cochrane took the T-21b to 4,000 ft. a.s.l.

London Gliding Club had one of its rare lee waves on December 1, when a south-east wind poured down the hill and rebounded up again. Among those who used it, Mike Fairman spent an hour at 2,500 ft. above take-off, which is 10 times the height of the steep part of Dunstable Downs. Interpolating between data from Sussex and Norfolk radiosonde stations, one finds this height to be just above the top of an inversion, and, once again, just at the bottom of a shallow layer where wind speed fell off with height.

At clubs with hill sites, anyone soaring in a lee wave created by the club's own hill can only regain the landing field by flying upwind through a downcurrent, and if the field is at the top, he may have to land at the bottom. Such lee waves at the Yorkshire Club were described by Bob Swinn and his wife Suzette, formerly manager and secretary of the club respectively, who, having come to live at Northampton, visited the London Club on January 5. Similar lee waves have been soared in at Long Mynd and, occasionally, at Camphill.

* * *

HOW MANY examples of the Scud III are still flying? The prototype, which had a Carden-Baynes motor in it and was called an "auxiliary sailplane," was produced by L. E. Baynes in 1935. It was eventually bought by a private owner who had no soaring experience, a fact which was demonstrated when he took off towards Dunstable Downs in a strong east wind and crashed in the inevitable but unexpected downcurrent.

After this, Baynes produced two more, I believe, without motors. One of these, built in 1936, was much flown by its owner, L. H. Barker, before the War, and was highly praised by him; its subsequent history is: overhauled by Martin Hearn in 1947; sold to J. Clarke of Fleetwood; then to G. Ratcliffe of the Handley Page Gliding Club, to whom he hired it; then to Bob Swinn, who swapped it for a Rhönbussard and added a motor; and finally to Aberdeen, apparently motorless once more.

A privately owned Scud III now resides at Dunstable, its previous owner being Ron Clear of Portsmouth, who rebuilt it from a condition of such wreckage that he had to estimate the fuselage length by the length of the control cables. It sounds as if this was the prototype. If so, can anybody now locate the third Scud III?

* * *

A CHRISTMAS CARD has cleared up a mystery of nearly 20 years' standing, namely, how old is the oldest British Silver "C" pilot? On September 8, 1937, Eustace Thomas flew his newly acquired Condor II 58 miles from Long Mynd to Ilchester in the Cotswolds, fulfilling both the distance and height qualifications for the Silver "C." This happened to be the day of the first British wave flights to be recognized as such, when John Simpson climbed 7,100 ft. and R. S. Rattray 6,500 ft. over the Long Mynd, though Thomas' height before dashing off down wind is not recorded.

Eustace Thomas had to wait till June 19, 1938, for an opportunity to complete his Silver "C" with a 5-hr. duration flight at Camphill; he was allotted No. 856 in the International list. But, while everyone knew he was the oldest Silver "C" pilot in the country, nobody could induce him to divulge his age, because if the clients of his engineering firm knew it, they might underestimate his staying power and transfer their custom to a firm with a greater apparent prospect of continuity.

Now there comes a Christmas card with the information that, although he no longer goes up solo, he is "still flying at 88." So we know at last that Mr. Thomas made his distance and altitude flights at an age of between 67¾ and 68¾, and completed his Silver "C" when aged 69, to the nearest half-year. Can any other country claim a pilot who completed his Silver "C" when older than 69?—A. E. SLATER.

CORRESPONDENCE

That Night Parachute Drop

SEEING H.J.C.'s Club Commentary in the January 3 edition of THE AEROPLANE made me wonder whether I should write to you before Yeadon did, to assure anyone concerned that that was not the airfield at which I made a delayed parachute descent the night of November 9, 17 days before that of Peter Lang's at the Plymouth Club. Also before any irate Frenchman puts pen to paper to dispute the claim of "the first in Europe" . . . words I was very startled to see had appeared in print elsewhere.

I assure you that though mine was, I believe, the first night drop to be made by a member of the British Parachute Club, I feel that in Britain alone there must be other civilians who have done the same before me, and would be very interested to hear if this is so.

S. E. BURGES (MISS).

Earls Court, London, S.W.5.

The Small Airship as a Naval Auxiliary

I GATHER from Mr. Gibbins' letter in your issue of November 22 that he is unaware of the fact that the small airship (or "Blimp") shares with the helicopter the ability to use a dipping Asdic, clearly a more promising proposition than the Sonobuoy or MAD to which fixed-wing maritime aircraft are restricted.

Mr. Gibbins may suggest that since the helicopter is being developed for anti-submarine warfare the blimp is unnecessary. The snag with the helicopter is that her endurance is only a few hours and in no way compares with that of the blimp which has demonstrated that she can remain airborne without refuelling for up to 10 *days*. This brings us to the helicopter carrier which, at vast expense, would enable a relay of A/S helicopters to operate in defence of a convoy until, inevitably, she fell victim to a torpedo salvo (obviously she would be priority one for enemy attention). After an hour or two, when the last of her helicopters had exhausted its fuel and fallen into the sea, the submarines would move in for the kill, which the few surface escorts would be unable to prevent (*vide* recent remarks by NATO maritime commanders). With a fleet of 500 submarines arrayed against us we should be faced with the virtual certainty of a succession of PQ.17s until, at the end of a few months, our merchant shipping was destroyed and we were faced with the alternatives of starvation or surrender.

I do not wish to comment on the political aspects of Mr. Gibbins' hypothesis that the next War may again find us running convoys round the North Cape to Russia or that blimps are likely to encounter air opposition in the Atlantic Ocean which, because of the restricted range and endurance of strike aircraft suitable for such ventures, could only be launched from carriers. If he envisages a war in alliance with the Soviet Union against the United States he can count me out!

I would, however, remind him that the first trans-Arctic flight from Norway to Alaska via Spitzbergen and the North Pole was carried out as far back as 1927 by the Italian blimp "Norge," while in recent months U.S. Naval blimps have given a most satisfactory demonstration of their capacity for maintaining an early warning patrol line in weather so bad that it grounded most of the heavier-than-air aviation in the area of operations. But even if, in rare and isolated weather conditions blimps *were* forced occasionally to abandon patrols, does that prove that they are worthless?

Does Mr. Gibbins believe that because a thick fog will still ground all heavier-than-air aircraft (though *not* airships, N.B.) that the R.A.F. and civil aviation should be abolished? I read that the liner "Queen Mary" was recently forced to reduce speed to seven knots in an Atlantic gale and was two days late in consequence, but I search the Press in vain for a statement from her dejected owners that in view of the occasional interruption of schedules by bad weather they have reluctantly decided to abandon the operation of ocean liners. Does anyone think that because tanks may sometimes encounter an impassable obstacle in the shape of, say, a marsh or mountain barrier, that they have no value in land warfare? Let us maintain a sense of proportion—the question is not whether a particular weapon is perfect, but whether it is the best available for its purpose in the prevailing circumstances.

If we had unlimited funds and manpower it might be feasible to conduct A/S operations with surface ships alone, but it is perfectly clear that these provisos will never be satisfied. If we are to survive another war the principle of economy of force must be rigorously upheld. A blimp is cheap, her fuel requirements are insignificant and she requires only 16 officers and men to man her on a two-watch basis. Compare this with the A/S frigate, or, worse still, with the helicopter carrier and her brood.

If a future war should last longer than a few weeks, sea communications must be protected in order that the million tons of supplies a week necessary for our existence may reach us. The small airship is potentially invaluable as a member of the anti-submarine team and also for providing early warning radar cover. It would be a tragedy if we should be deprived of her aid because of arguments which are as superficial as they are specious.

Nicosia, Cyprus.

F. P. U. CROKER,
LIEUT. CDR., R.N. (RETD.).

Aroundabout

If you, like *Readers Digest*, have wondered what it is that stewardesses mutter to each other as they pass in the cabin aisle, listen to what that magazine says it overheard during a recent flight: "Watch yourself when you go up front—they've got the automatic pilot in."

*

A sign exhibited at a filling station on the road from the Las Vegas gambling saloons to the airport reads: "FREE—ASPIRIN AND TENDER SYMPATHY."

*

Editorwell. An airline house magazine, reporting an aeronautical Brains Trust, said "Opinions were divided very equally." By the next post the editor received a note: "Surely some were divided more equally than others?"

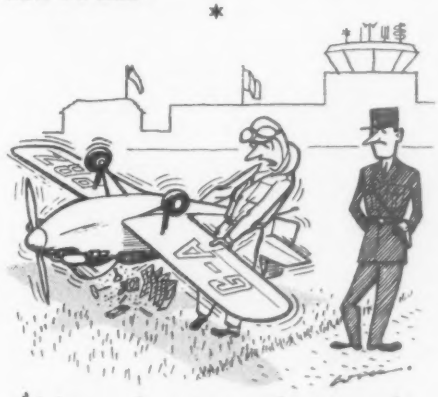
*

The White Paper has a lot to answer for. Aviation as a career now looks so depressing to some that the attendance at one aeronautical school is such that anybody taking the course can be assured of the rating: "In a class by himself."

*

Those Air Films. The readers who didn't like the film "High Flight" should be grateful for its technical integrity, a virtue missing from such pre-War films as H. G. Wells' "Things to Come," recently re-screened on TV. After seeing a mass formation of Heinkel-size bombers surging through black war-clouds, a close-up of one of them reveals a Mew Gull in bright sunshine. A Hawker Fury biplane riddles the Gull's pilot, who nevertheless survives this and a screaming dive into the ground, only to die with his head in the lap of the Fury pilot (who had landed alongside) from the poison gas which he had very stupidly dropped just up-wind from where he crashed. And I can remember worse things than this in some of those old films.

*



"I know I put my documents somewhere in here..."

by Crem

NOTES AND EVENTS

FOR AIRCRAFT HANDLING.—Towing a Canadair DC-4M (Argonaut class) of East African Airways at Eastleigh Airport, Nairobi, is this David Brown VIG/IC industrial tractor. The 41-h.p. tractor has a maximum drawbar pull of 7,100 lb., and is in regular use for the ground movement of aircraft.

RESISTANCE WELDER.—New from Sciaky Electric Welding Machines, Ltd., of Slough, is a resistance-welding machine known as the UAM.150. It is primarily designed for research work into either spot, seam, roll-spot or projection welding, and can be used for production runs if necessary.

Going Strong

NOT for the first time, Ferguson tractors are very much in the news—this time in connection with the success of the Antarctic expedition. The gentleman behind this tractor is H. G. Ferguson—of Irish birth towards the end of 1884.

Round about 1910-11 a Mr. H. G. Ferguson was having mixed luck round Newtownards with an aeroplane of his own construction and towards the end of the latter year he successfully took up passengers, including a lady.

In 1913 the monoplane appears again (at Magilligan) being flown by a Mr. O. G. Lywood who said that he could not speak too highly of the design and construction of the Ferguson, which had stood two years' exposure to the weather.

It would seem that Mr. Ferguson has not lost his touch in this capacity.—F.H.S.

M.E. RESEARCH.—Two Agusta-Bell 47J helicopters are to be used by Aero Contractors, Ltd., a concern formed recently by the Aero Ypenburg and M.B.V. companies of the Netherlands, to undertake flights for geological research in the Persian Gulf area. The flights are to be made for the Iranian Oil Exploration and Producing Co. It is also reported that Aero Contractors, Ltd., has four Kolibrie ultra-light helicopters on order from the Dutch K.N.V. company and these are to be used for agricultural work. The company plans to build up a fleet of 80 helicopters in a few years.

"The Aeroplane" Diary

There are a few copies of "'The Aeroplane' Diary" for 1958 still available. They can be obtained from Temple Press Limited, Bowling Green Lane, London, E.C.1, at the following prices: Leather edition, 6s. (6s. 6d. by post), rexine edition, 4s. (4s. 4d. by post). Both prices include purchase tax.

A.B.A.C. DINNER.—The annual dinner of the Association of British Aero Clubs and Centres will be held at the Waldorf Hotel, London, on February 7 at 19.00 hrs. for 19.30 hrs. Lord Runciman, the president of the Association, will be in the chair.

BRITISH STANDARDS.—The following new standards have been published by the British Standards Institution and are available from 2 Park Street, London, W.1: "B.S.A.204—A.209: 1957—Machine screws (Unified threads) for aeronautical purposes" (7s. 6d.); and "B.S.E.24: 1957—Nyvin-type electric cables for aircraft" (7s. 6d.).

COSSOR IN EIRE.—The Cossor Group of Companies has formed a new subsidiary in Dublin. It will market Cossor instruments and generally look after the sale of the company's products, including radar and communications equipment. Chairman of the board of the new company is Mr. J. S. Clark, who is joint managing director of A. C. Cossor, Ltd.

LECTURE CANCELLED.—The R.Ae.S. Section lecture, "Power Controls for Supersonic Aircraft," which was to have been given by Mr. G. Selwood, A.F.R.Ae.S., on February 4, has been cancelled.

Aviation Calendar

January 18.—Aircraft Recognition Society, 11th All-England Aircraft Recognition Competition, in the lecture theatre, R.Inst. of Great Britain, 21 Albemarle Street, **London,** W.1, at 14.15 hrs.

January 21.—Inst. of Civil Engineers lecture, "The Design and Construction of the Foundations and Pressure Shell of the 8 ft. by 8 ft. High-speed Wind Tunnel of the R.A.E., Bedford," by J. F. Greinig, R. W. Horsman and A. N. Kinkead, at Great George Street, **London,** S.W.1, at 17.30 hrs.

January 21.—R.Ae.S. Luton Branch lecture, "New Methods of Approach to Airworthiness," by W. Tye, O.B.E., B.Sc., F.R.Ae.S., in the Napier senior staff canteen, **Luton Airport,** at 18.15 hrs.

January 21.—R.Ae.C. Dinner to Winner, King's Cup Air Race, and British Air Racing Champion, at 119 Piccadilly, **London,** W.1, at 19.30 hrs. for 20.00 hrs.

January 21.—R.Ae.S. Section lecture, "Environments and Environmental Testing," by P. J. Duncton, A.F.R.Ae.S., and T. F. R. George, A.F.R.Ae.S., in the library, 4 Hamilton Place, **London,** W.1, at 19.00 hrs.

January 22.—Kronfeld Club film show, "Test Flight," and "Approaching Speed of Sound" (Shell-B.P. Films), at 74 Eccleston Square, **London,** S.W.1, at 20.00 hrs.

January 23.—R.Ae.S. Guided Flight Section lecture, "Guidance and Control," by L. H. Bedford, C.B.E., M.A., B.Sc., in the library, 4 Hamilton Place, **London,** W.1, at 19.00 hours.

January 28.—R.Ae.S. Bristol Branch lecture, "Aircraft Flight Systems," by Capt. A. M. A. Majendie, in the conference room, Bristol Aircraft, Ltd., Filton House, **Bristol,** at 18.00 hrs.

January 29.—R.Ae.S. Preston Branch lecture, "Ramjets," by Dr. R. R. Jamison (Asst. Chief Engineer, Ramjets, Bristol Aero-Engines, Ltd.), at the Queen's Hotel, **Lytham,** Lancs, at 19.30 hrs.

January 29.—R.Ae.S. Weybridge Branch, film show at the Apprentice Training School, Vickers-Armstrongs (Aircraft), Ltd., **Weybridge,** at 18.00 hrs.

January 29.—R.Ae.S. Southampton Branch lecture, "Flight Testing Procedures at Supersonic Speeds," by Wg. Cdr. R. P. Beamont, D.S.O., O.B.E., D.F.C., A.R.Ae.S., in the Inst. of Education, **University of Southampton,** at 19.00 hrs.

February 1.—British Interplanetary Society lecture, "Meteoric Hazards to Space Flight," by Dr. N. H. Langton, M.Sc., A.Inst.P., in the Tudor Room, Caxton Hall, **London,** S.W.1, at 18.00 hrs.

February 4.—R.Ae.S. Luton Branch lecture, "Development of the Armstrong Siddeley Viper," by W. H. Lindsey, M.A., F.R.Ae.S., in the Napier senior staff canteen, **Luton Airport,** at 18.15 hrs.

February 4.—Inst. of Civil Engineers lecture, "The Use of Aerial Photography by Railways," by N. E. V. Viner-Brady and H. M. Pearson, at Gt. George St., **London,** S.W.1, at 17.30 hrs.

Company Notices

NEW COMPANY

Hunting-Clan Airservices, Ltd. (596,136).—Private co. Reg. Dec. 30. Cap. £100,000 in £1 shs. The subscribers (each with one share) are: D. Ian Wilson and P. J. Gaynor, solicitors, both of 12 Whitehall, London, S.W.1. First directors to be appointed by subscribers. Solrs.: McKenna and Co., 12 Whitehall, London, S.W.1.

New Patents

APPLICATIONS ACCEPTED

791,101.—Jarry Automobile Ltée.—"Steering mechanism for aircraft nose wheels, or the like."—March 3, 1956 (Nov. 16, 1955).

Applications open to public inspection on Feb. 26, 1958; opposition period expires on May 26, 1958.

Personal Notices

BIRTHS

Easterbrook.—On December 27, at Wegberg, Germany, to Anne, wife of Sqn. Ldr. R. L. Easterbrook—a son.

Gardiner.—On December 31, to Eileen, wife of Sqn. Ldr. R. E. Gardiner, D.F.C.—a son.

Gordon.—On January 1, at Stamford, to June, wife of Sqn. Ldr. D. C. Gordon—a daughter.

Hamlin.—On January 2, at Bahrein, to Barbara (*née* Thompson), wife of Flt. Lt. A. T. Hamlin—a daughter.

Jackson.—On January 7, at Halton, to Patricia M. (*née* Saxton), wife of Sqn. Ldr. W. S. Jackson—a son.

Penfold.—On January 5, at Cosford, to Pauline, wife of Sqn. Ldr. H. K. Penfold—a daughter.

Reeve.—On January 6, in Cornwall, to Mattie, wife of Flt. Lt. R. Reeve—a son.

Routh.—On January 3, at Rintein, Germany, to Anne (*née* Bluckt), wife of Sqn. Ldr. J. E. Routh, M.R.C.S., L.R.C.P.—a son.

DEATH

McCarthy.—On December 30, in a flying accident in Germany, Flt. Lt. D. T. McCarthy.